6-1-2018

Water scarcity and population displacement in southern Iraq: Perceptions and reality

Tiba Fatli

The American University in Cairo
School of Global Affairs and Public Policy

Water Scarcity and Population Displacement in Southern Iraq: Perceptions and Reality

A Thesis Submitted to
The Center of Migration and Refugee Studies

In partial fulfillment of the requirements for the degree of
Master of Arts (M.A.) in Migration and Refugee Studies

Specialization in Migration

by Tiba Fatli
under the supervision of Dr. Usha Natarajan

May 2018

May 2018

Water Scarcity and Population Displacement in Southern Iraq: Perceptions and Reality

Tiba Fatli
Center of Migration and Refugee Studies M.A. Thesis | Migration Concentration
Under the Supervision of Dr. Usha Natarajan
Committee Members: Dr. Abdulameer Al-Dafar and Dr. Shahjahan Bhuiyan
May 2018

Acknowledgment

The process of completing this degree and thesis was not an easy one for a number of reasons, and at times, I found myself frustrated and on the verge of quitting. But in these moments, I found individuals who helped me stay grounded:

To my advisor: Dr. Usha Natarajan, whose work, guidance and passion made this thesis possible. Her critiques and teaching methods pushed me to engage with migration and environmental studies in a critical and productive way. Most importantly, Dr. Natarajan pushed me to think of my own role and my existence in an unequal and unjust world.

To my readers: Dr. Abdualmeer Al Dafar who pushed me to do fieldwork and supported me during the process. And Dr. Shahjahan Bhuiyan for his kindness and feedback on the thesis.

To Iraq: To Nature Iraq advocates, Jassim Al Asadi, Laith Al Obadi and Ahmed Saleh, who made southern Iraq a home during my fieldwork. To the communities in southern Iraq that shared with me their lived experiences and gave me a life-long supply of tea.

To family and friends: Baba and Mama, you crossed rivers and continents to see me succeed. Thank you. My sibling, Hajir, Jaafar, Hamoody and Faidh, for their laughter and support. To the bright, strong and kind women in my life who keep me sane, Claire M., Ayah Abo Basha, and Zerrin Holla. To my partner, Zander Pellegrino, for his support, love and kindness. To Diana for her insightful and great feedback throughout the thesis writing process.

To Banan Abdulrahman: the strong woman of color who has challenged me in many ways, kept me grounded and reminded me of my abilities. The woman who made Cairo home by her mere presence and who gives me hope in an unjust and an unequal world. I am forever grateful for your heart, mind and soul.

In the words of Arundhati Roy, *"another world is not only possible, she is on her way. On a quiet day, I can hear her breathing.*" A just world is only possible because people like Banan exist.

Abstract

Water Scarcity and Population Displacement in Southern Iraq: Perceptions and Reality

Tiba Fatli

The American University in Cairo

under the supervision of Dr. Usha Natarajan

This thesis argues that water scarcity causes significant displacement in Iraq's southern region. It makes two related sub-points. First, in addition to local factors, international and transnational factors contribute to water scarcity and attendant displacement in Southern Iraq. Second, the stakeholders – whether displaced populations, local government officials, federal policy makers, non-governmental organizations or international development organizations – focus on particular factors of water scarcity rather than addressing the causes holistically. In general, researchers and policy-makers underestimate or neglect water-related causes of displacement, not only in Iraq but globally. Even when addressed, emphasis is placed on local and national causes, without contextualizing the relationship between internal and external factors. This thesis asks for more attention to be paid to how national, international, and transnational factors operate alongside and in relation to each other. Effective policies also need to understand how displaced persons perceive these factors because their lived experiences often differ from institutionalized international narratives on resource management. Ultimately, policy-making will be more effective at all levels by better understanding the water-related reasons for displacement in the national, international, and transnational contexts in an interrelated way.

Water Scarcity and Population Displacement in Southern Iraq

TABLE OF CONTENTS

CHAPTER FOUR: PERCEPTIONS OF WATER SCARCITY: REPORTING FROM THE REGION

CHAPTER FIVE: PRODUCTION OF WATER SCARCITY: PERCEPTIONS AND REALITY

ANNEX

Introduction

The Arab region is among the most vulnerable to climate change.[1] Among the Arab countries, the United Nations (UN) has listed Iraq as "one of the Arab region's most vulnerable countries to climate change."[2] In particular, a 10 per cent to 60 per cent reduction in precipitation in the Turkish highlands predicted by the Inter-Governmental Panel on Climate Change (IPCC) is expected to reduce the flow of the Tigris and Euphrates into Iraq.[3] One recent study reveals that the Euphrates River has lost at least 40 per cent of its flow to downstream countries since 1972 and predicts a further reduction in the overall flow of the river in the coming decade. In fact, the entire fertile crescent may disappear by the end of the century.[4] Ironically, Iraq is undergoing complications in water availability despite having one of the most abundant water resources in the Arab region.[5] In addition, Iraq faces more frequent and severe sand and dust storms as well as extreme heat and drought episodes, that are also impacting livelihoods. Water scarcity and increases in environmental hazards are the direct result of climate change.[6]

Climate change has numerous detrimental human implications, including, among other things, forced movement. During the 2007 to 2009 droughts that Iraq experienced, almost 40 per cent of

---

[1] Pilifosova, O. "Chapter 7: The Regional Impacts of Climate Change" in eds. R.T. Watson, M.C. Zinyowera, and R.H. Moss *The Regional Impacts of Climate Change, An Assessment of Vulnerability (*Cambridge University Press, IPCC, 1997).

[2] "Climate change in Iraq." Relief Web. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Climate%20change%20In%20Iraq%20Fact%20sheet%20-%20English.pdf> .

[3] IPCC (2007), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S.; Qin, D.; Manning, M.; Chen, Z.; Marquis, M.; Averyt, K.B.; Tignor, M.; and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, United States. Note that for its fth Assessment Report (AR5), the IPCC has adopted Representative Concentration Pathways (RCPs) for climate modelling and research. See: IPCC (2013), Summary for Policymakers. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F.; Qin, D.; Plattner, G.-K.; Tignor, M.; Allen, S.K.; Boschung, J.; Nauels, A.; Xia, Y.; Bex, V.; and Midgley, P.M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, United States.

[4] *Shamouta, M. Nouar and Lahn, Glada*. "The Euphrates in Crisis: Channels of Cooperation." Chatham House: The Royal Institute of International Affairs. 2014. Access at < https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20150413Euphrates_0.pdf>

[5] "Climate change in Iraq." Relief Web. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Climate%20change%20In%20Iraq%20Fact%20sheet%20-%20English.pdf> .

[6] IPCC (2007), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S.; Qin, D.; Manning, M.; Chen, Z.; Marquis, M.; Averyt, K.B.; Tignor, M.; and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, United States. Note that for its fth Assessment Report (AR5), the IPCC has adopted Representative Concentration Pathways (RCPs) for climate modelling and research. See: IPCC (2013), Summary for Policymakers. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F.; Qin, D.; Plattner, G.-K.; Tignor, M.; Allen, S.K.; Boschung, J.; Nauels, A.; Xia, Y.; Bex, V.; and Midgley, P.M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, United States.

the cropland declined, and livestock was decimated; more than 100,000 people were displaced from the northern governorates as a result.[7] Two years later, the high level of salinity in Iraq's Shatt Al-Arab — a river formed by the confluence of the Tigris and Euphrates located in Iraq's southern governorate of Basra — forced hundreds of families to abandon their land.[8] The impact of climate change on water resources is an important factor on displacement in Iraq.

While climate has always been an important factor in movement and settlement patterns,[9] forced movements vary in severity, frequency, and pattern depending on the change.[10] People may move as a result of sudden environmental disasters or slow-onset environmental changes; these movements can be cyclical or permanent.[11] The most often quoted number of the anticipated influx of environmentally-induced migrants is from Myers, who predicts that 200 million individuals will be displaced by 2025.[12] This number has also been cited by the Stern Review and the IPCC.[13] Rapid changes in the environment and subsequent resource scarcity will not only produce economic migrants — those moving due to the loss of their livelihoods[14] — but will also cause conflict-related displacement, as it has in Bangladesh, Senegal, Mauritania, the Philippines, and El Salvador, among other counties.[15] Africa and Asia will be the most impacted

[7] *Ibid;* "Climate change in Iraq." Relief Web. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Climate%20change%20In%20Iraq%20Fact%20sheet%20-%20English.pdf> .
[8] "Climate change in Iraq." Relief Web. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Climate%20change%20In%20Iraq%20Fact%20sheet%20-%20English.pdf> .
[9] For example: Lakota of the North American Plains prior to European settlement, pastoralist nomadic societies. Read more in Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>.
[10] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>
[11] *Ibid*.
[12] Myers, Norma. "Environmental refugees: a growing phenomenon of the 21st Century." Philos Trans R Soc Lond B Biol Sci. 357, no. 1420 (2002): 609-613.
[13] IPCC, 2014: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; Nicholas Stern, "The Economics of Climate Change," Brown *University.*
[14] *Ibid*
[15] Aydogan, Hakan, "Environmental Scarcity and Global Security" The Assessment of Environment Related Conflicts in Bangladesh, Senegal-Mauritania, Philippines and El Salvador." *European Scientific Journal Match* 1, no. 8 (2015): 1857-7881.

by climate change, which will cause large movements of people. [16] Thus, the effect of climate change on displacement is an urgent contemporary topic meriting further academic study.

Though environmental change is one of the largest generators of human displacement, there is remarkably little knowledge and work about its complexity and multivariate process.[17] This is especially true of the Arab region and Iraq in particular. To help fill this knowledge gap, this thesis addresses one of the most pressing environmental issues facing Iraq—water security and its links to displacement. This thesis argues that water issues in Iraq continue to cause significant displacement in the country's southern region and, in addition to local factors, international and transnational factors contribute to scarcity and displacement as well. For effective policy-making, more attention needs to be paid to how national, international, and transnational factors operate alongside and in relation to each other. Effective policy-making also needs to understand how displaced persons perceive these factors because their lived experiences often differ from institutionalized international narratives on resource management. In particular, policy-making on displacement tends to neglect water-related causes not only in Iraq but globally. And even when addressed, policy-making places undue emphasis on local and national causes without appreciating the relationship between internal and external factors. Ultimately, policy-making will be more effective at all levels by better understanding the water-related reasons for displacement in the national, international, and transnational contexts in an interrelated way.

[16] *Ibid*.
[17] Boano, Carmillo, Roger Zetter, and Tim Morris. "Environmentally displaced people: understanding the linkages between environmental change, livelihoods and forced migration." Refugee Studies Centre. 2008. Access at < https://www.unicef.org/spanish/socialpolicy/files/Environmentally_displaces_people.pdf>.

Methodology

This thesis utilizes secondary sources on causes of water scarcity and its implications on the displacement of animal herders and farmers whose livelihoods have become threatened by the increasing severity and of abrupt nature of weather conditions. The secondary research provides background information and data on water issues in Iraq, historical events, and climate change.

The thesis also includes fieldwork to understand how displaced communities, policy makers and civil society groups in southern Iraq perceive the causes of water scarcity that are forcing people to move. Of the five southern Iraqi governorates, Maysan, Dhi Qar, Basra, Missan, Najef, Al Qadyysiah, fieldwork included three—Dhi Qar, Al Qadyysiah and Missan. These three governorates were selected because they are located on the Tigris and Euphrates Rivers: Dhi Qar and Al Qadyysiah rely on the flow of the Euphrates, while Missan relies on the Tigris before it flows into the Shatt Al-Arab. In addition, these three governorates have experienced the largest numbers of environmentally-induced displacement, and they were also the safest to visit during the time of fieldwork. These governorates are within the region of southern Iraq and have the same climatic characteristics.

The fieldwork was six weeks long and it took place between November 28, 2017 to January 7. It consisted of participant observation, semi-structured interviews and content analysis of original documents and data from Iraq's Ministry of Environment and the Ministry of Water Resources. The semi-structured interviews were conducted with 58 persons who have been displaced or face the threat of displacement due to water scarcity; 3 members of civil society groups, primarily

Nature Iraq;[18] and 9 local government officials in each governorate. Officials interviewed were all Directors employed in either the Directorate of Water Resources, the Directorate of Environment, or the Directorate of Agriculture. The snowballing method was used for collecting data within the communities and I spent around a week and a half in each governorate. The reason for selecting the Directorate of Water Resources, Directorate of Agriculture and the Directorate of Environment is because they all are involved on a local level in the decision-making process on water issues and work together to manage water resources in Iraq.

The purpose of this fieldwork is to provide an understanding of how those who are directly affected by water scarcity perceive the causes of the scarcity, and how officials who are working on policies related to water and the environment perceive water scarcity. These perceptions are analyzed alongside international perceptions of water scarcity in Iraq. Furthermore, perceptions are compared with data on the various internal, transnational and international factors that impact water scarcity in order to identify knowledge gaps and policy-making consequences. In particular, this fieldwork examines how the gap between displaced communities' understandings of climate change and that of policymakers' differ, thus limiting the impact of the latter's attempts to prevent further displacement.

Conceptual Framework

There are two main concepts that this thesis relies upon: Linton's concept of "hydroelectics",[19] and Chimni's theory of the imperial global state. Both these concepts are used to analyze displacement in Iraq related to water scarcity. Linton's concept of "hydroelectics" provides a

[18] Nature Iraq is a non-profit organization that operates throughout Iraq. It is mainly run by Iraqis.
[19] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.

bottom-up approach to analyzing the perceptions of individuals, communities, and local decision-makers. Chimni's theory of the global imperial state is a top-down approach, particularly useful to understand what happened in Iraq following the 2003 War reforms, particularly in the water sector, and how these changes impacted the perceptions and knowledge about water among policymakers at various levels of governance from the global to the national to the local. These concepts are employed together as the insights they provide are complimentary, together providing a comprehensive and holistic examination of the causes of water scarcity and their link with displacement in southern Iraq.

Linton argues that the modern concept of water strips water of its environmental, social and cultural context, reducing it to a scientific abstract that obfuscates the bigger picture, which is that every issue involving water is realized in a specific social and cultural context.[20] This abstraction of water has given modern society the right to dam, divert and manipulate water with impunity. More importantly, the local community's knowledge about water is left out of hydraulic projects and local stakeholders are mostly ignored.[21] This normalizes the manipulation of water resources and the social implications it has on communities, such as population displacement. Linton outlines the practice of social hydrology, which he calls "hydroelectics," which maintains that knowledge about water is a product related to social circumstances and modes of knowledge: "water is what we make of it."[22] He further concludes that the solution to the water crisis involves rethinking water in terms of its social content.[23] This thesis employs Linton's concept of "hydroelectics" to analyze the difference between how displaced

[20] *Ibid*
[21] *Ibid*
[22] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010. Pg. 3
[23] *Ibid*

communities perceive the causes of water scarcity–the driver of their displacement—and policymakers whose knowledge of water scarcity in Iraq, I argue, reflects not the knowledge of the communities but the discourse of international entities. As a result of this, Iraqi policymakers don't appreciate the complexity and nuances of water scarcity, and how it impacts displacement in their local communities.

The thesis also engages with Chimni's work in analyzing policymakers' perceptions of water and how their knowledge about water is produced. Chimni stipulates that international institutions help further the interests of powerful states and an emerging transnational capitalist class by increasing the power and influence of corporations at the expense of third world peoples.[24] In the case of Iraq, this was done through reforms imposed after a coalition of countries invaded Iraq in 2003. Relying on Chimni's analytical framework, I argue that displaced communities' knowledge of water is excluded in policy making and water management. Policymakers' perceptions instead reflect the water management discourse of international organizations, resulting in abstracting water from its local social and environmental context and excluding the voices of local communities in southern Iraq and instead favoring the interests of corporate actors that profit from control of water.

Thesis Outline

Chapter One describes the link between climate change and displacement, providing background on the literature on environmentally-induced displacement and the different environmental factors that contribute to displacement. Chapter Two provides a background on water in southern

[24] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37. Pg. 14-15.

Iraq, outlining the internal, international and transnational factors that have impacted water in the past and changed the main rivers' courses. This Chapter does not provide a comprehensive historical review but rather examine historical events relevant to water and displacement. Chapter Three considers water and displacement in post-2003 Iraq, analyzing the commercialization and privatization of water in the era of globalization and focusing on the interplay between international and transnational factors in managing water in. This chapter engages with Chimni's work to show how post-2003 neoliberal policy has promoted the interests of the private sector and, in turn, impacted water quality and displacement in Iraq.

Chapter Four details fieldwork conducted between November 2017 to January 2018. All the details are outlined in the annex. Chapter Four reports on the perceptions of the current issues of water scarcity in Iraq, in particular the discrepancies between the perceptions of the displaced communities and civil society groups, and policymakers. It explains the methodology used for the fieldwork and includes the profiles of the areas and groups studied. Chapter Five builds on the fieldwork and existing literature on water scarcity in Iraq to examine the difference between perceptions and actual data. The chapter engages with Linton and Chimni's concepts to analyze perceptions of water scarcity. It argues that displaced communities whose livelihoods are directly impacted by water scarcity have a certain social relationship with water, the context in which their hydro-social relationship is produced. This social understanding of water influences how communities perceive water scarcity. I conclude that in order for Iraq to address water scarcity and the resultant displacement, it needs to listen to those most impacted; and consider the confluence of international, transnational and local causal factors holistically when engaging in policy-making.

Chapter One: Environmentally-Induced Displacement

This chapter provides an overview of the literature on environmentally-induced displacement. It describes the three main issues that have sparked interest among scholars on this topic: the definition of environmentally-induced displacement, links between environmental degradation and displacement, and institutional and legal protection mechanisms for people displaced as a result of environmental conditions. My purpose is to highlight some of the complexity and nuance in the field of environmentally-induced displacement.

Anthropogenic, or man-made, climate change is one of the biggest challenges facing humanity. Scientific studies observe that post-industrial rise in greenhouse gases are the dominate cause of global warming that is causing significant changes in physical and biological systems on all continents and in most oceans at a rapid rate.[25] The significant rise in the greenhouse gasses since the post-industrial era are a result of human activities are such as fossil fuel extraction and land use, mainly deforestation and agriculture. [26] Generally, between 45 to 57 per cent has been absorbed by the atmosphere and the remaining greenhouse gases have been absorbed by the ocean and land biosphere.[27] The greenhouse gases that absorbed are causing significant warming in the global climate.[28] This global warming which is largely attributed to western-led industrial

[25] IPCC (2007), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S.; Qin, D.; Manning, M.; Chen, Z.; Marquis, M.; Averyt, K.B.; Tignor, M.; and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, United States. Note that for its fth Assessment Report (AR5), the IPCC has adopted Representative Concentration Pathways (RCPs) for climate modelling and research. See: IPCC (2013), Summary for Policymakers. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F.; Qin, D.; Plattner, G.-K.; Tignor, M.; Allen, S.K.; Boschung, J.; Nauels, A.; Xia, Y.; Bex, V.; and Midgley, P.M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, United States.

[26] Scientific models differ in measuring the amount of CO2 absorbed, and thus, and the results of how much has been absorbed by the planet vs the atmosphere is different. "The Missing Carbon Sink." The Environmental Literacy Council. Access at <https://enviroliteracy.org/air-climate-weather/climate/the-missing-carbon-sink/>.

[27] Rahmstorf, Stefan. "Anthropogenic Climate Change: Revisiting the Facts" in ed. Ernesto Zedillo *Global Warming: Looking Beyond Kyoto* (Yale Center for the Study of Globalization and Sciences-Po, Paris, Brookings Institution Press, 2008) 34-54.

[28] *Ibid*.

development model will have significant and disproportionate impact on the global South rending areas uninhabitable and resulting in extreme and unpredictable weather events.[29]

The magnitude of the impact of global warming as well as the unpredictability and complexity that accompanies it has sparked interest among scholars across disciplines. During the 1970s and 1980s, experts working on environmental change began studying the implications of environmental degradation on human displacement, which in turn played an important role in drawing the attention of the international community to the gravity of the issue.[30] While there has been growing literature on environmental issues and displacement since then, the subject remains understudied, fragmented, and in need of more robust evidence.[31]

Scholars disagree on the definition of environmentally-induced displacement and protection mechanisms for displaced populations. There is general consensus that there are two main types of climatic events that cause displacement: rapid-onset events, such as extreme and short-term weather conditions; and slow-onset ones such as those that exacerbate desertification and rising sea levels.[32] The type of displacement caused by environmental change, particularly slow-onset events, is likely to be permanent. Individuals' returns to their places of origin are improbable as land slowly becomes uninhabitable and in some cases, disappear.[33] Jane McAdam theorizes that while a small number of people will cross borders, the majority of environmentally-related

[29] Brock, Hannah. "Climate Change: Drivers of Insecurity and the Global South." Oxford Research Goup. 2012. Access by <http://www.oxfordresearchgroup.org.uk/sites/default/files/Climate%20Change%20and%20Insecurity%20in%20the%20Global%20South.pdf>.
[30] Gomez, Oscar, "Climate change and migration: a review of the literature." International Institute of Social Studies, *The Hague (Erasmus University Rotterdam)*. 2013. Access by < http://www.shram.org/uploadFiles/20170519024801.pdf>.
[31] Raleigh, C. "The search for safety: the effects of conflict, poverty and ecological influences on migration in the developing world." *Global Environmental Change* 21, no. 1 (2011): Pg. 82-93; Bardsley, DK. and Graeme J. Hugo, "Migration and climate change: examining thresholds of change to guide effective adaptation decision-making.*"Population and Environment* 32, no. 2 & 3 (2010):238-262; Gray, Clark and Richard Bilsborrow. "Environmental Influences on Human Migration in Rural Ecuador." *Demography* 4 (2013): 1217–1241.
[32] Brown, Oli and Alec Crawford, "Rising Temperatures, Rising Tensions: Climate Change and the Risk of Violent Conflict in the Middle East" International Institute for Sustainable Development. 2009. Access at < http://www.iisd.org/library/rising-temperatures-rising-tensions-climate-change-and-risk-violent-conflict-middle-east>
[33] *Ibid.*

displacement is likely to be internal.[34] More specifically, movement will be centered in the global South, in the rural areas of Africa and Asia. These two continents will be the most impacted by climate change and thus will witness the largest movements.[35] The estimated number of people who are predicted to be environmentally displaced is staggering. In 1995, Myers projected that there were at least 25 million "environmental refugees" existing already and predicted that a total of 200 million individual would be displaced by 2025.[36] This figure has been quoted repeatedly in reports and peer-reviewed journals.[37] Repetition, of course, doesn't make numbers accurate.[38] Myers himself indicated that the data, while calculated from the best available data, requires "heroic extrapolations", evidencing the challenges of conducting research in this area.[39] The next two sections respectively consider the terminology, and the link between environmental issues and displacement.

Terminology

The debate on how to identify those displaced for environmental reasons is ongoing. Scholars and institutions differ in how they define and categorize environmental displacement. On the one hand, there is a growing body of literature that views population movement linked to the environment as "migration." Among the most cited and widely encompassing definitions is that of the International Organization of Migration (IOM), which defines environmental migrants as:

[34] McAdam, Jane. *Climate Change, Displacement and International Law, OUP Oxford,* 2012.
[35] Bhattacharyya, Arpita and Michael Werz. "Climate Change, Migration, and Conflict in South Asia Rising Tensions and Policy Options across the Subcontinent." Center for American Progress. 2012. Access at < https://www.americanprogress.org/issues/security/reports/2012/12/03/46382/climate-change-migration-and-conflict-in-south-asia/>.
[36] Myers, Norma. "Environmental refugees: a growing phenomenon of the 21st Century." Philos Trans R Soc Lond B Biol Sci. 357, no. 1420 (2002): 609-613.
[37] *For example, see:* Castels, Stephen, Haas, Hein, and Miller, Mark. *The Age of Migration: International Population Movements in the Modern World*. Palgrave Macmillan, 2014; Bates, DC. "Environmental Refugees? Classifying Human Migration Caused by Environmental Change." Population and Environment 23, no. 5(2002): 465-477; Hinrichsen, Don. *Coastal Waters of the World: Trends, Threats, and Strategies*. Island Press. Washington, DC, 1998; Massey, Douglas, Axinn, William G, Ghimire, Dirgha J. "Environmental change and out-migration: evidence from Nepal." Population & Environment 32, no. 2 & 3 (2010): 109-136.
[38] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>
[39] Ibid.

> Persons or groups who, for reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad.[40]

IOM's definition encompasses different kinds of environmental displacement. Another important institutional definition from the UN Refugee Agency (UNHCR) defines environmentally-displaced people as those "who are displaced from or who feel obliged to leave their usual place of residence, because their lives, livelihoods and welfare have been placed at serious risk as a result of adverse environmental, ecological or climatic processes and events."[41] The agency has been cautious in its definition, avoiding any reference to "refugee" or cross-border movement. It has also avoided reference to displacement related to persecution, armed conflict or human rights violations. This definition operates within UNHCR's mandate, which has expanded to include internal displacement particularly that resulting from sudden environmental disasters.

On the other hand, scholars like El-Hinnawi, Myers and Kent use the term "environmental refugees" rather than "migrants" to describe the movement.[42] Myers affirms El-Hinnawi's position and describes environmentally-displaced people as "persons who no longer gain a secure livelihood in their traditional homelands because of what are primarily environmental factors of unusual scope."[43] For Myers, the term "refugees" captures the nature and severity of environmental movement.

[40] "Migration, Environment, and Climate Change." International Organizations for Migration. 2009. Access at < https://publications.iom.int/system/files/pdf/migration_and_environment.pdf>
[41] Boano, Carmillo, Roger Zetter, and Tim Morris. "Environmentally displaced people: understanding the linkages between environmental change, livelihoods and forced migration." Refugee Studies Centre. 2008. Access at < https://www.unicef.org/spanish/socialpolicy/files/Environmentally_displaces_people.pdf>.
[42] Myers, Norman and Jennifer Kent, "Environmental exodus: an emergent crisis in the global arena." The Climate Institute. 1995. Access at < http://climate.org/archive/PDF/Environmental%20Exodus.pdf>.
[43] *Ibid.*

Recently, scholars of migration have critiqued and steered away from using the term "refugee," recognizing its narrow legal definition entrenched in the 1951 Convention Relating to the Status of Refugees. They see the term "refugee" as ill-fit for environmentally-displaced people, especially those who move due to slow-onset climatic events.[44] In particular, Castels and Lee have critiqued El-Hannawi's notion of "environmental refugees" as being poorly-defined and consequently legally meaningless and confusing.[45] Richard Black reaffirms this view. He is a trenchant opponent of the concept of "environmental refugee" and prefers to use the terms "migration," "movement" or a "customary coping strategy."[46]

Unlike Black, Castel and Lee, Bates takes a more nuanced approach and argues that depending on the kind of displacement, the term "environmental refugees" is appropriate. She argues that those displaced by disasters and expropriation of land have limited control over their decision to move and can thus be called "environmental refugees." Furthermore, Bates posits that displacement as a result of a gradual degradation of the environment should be referred to as "environmental migration" due to the long, slow-onset process that gives people time to plan for movement and is thus not forced.[47]

Dun also recognizes the complexity of defining environmental migrants and largely attributes this complexity to the difficulty in isolating environmental factors from other drivers of

[44] Hollifield, James and Idean Salehyan. "Environmental Refugees." Wilson Center. 2015. Access at < https://www.wilsoncenter.org/article/environmental-refugees>; *Note that according to the 1951 Convention Relating to the Status of Refugees, a refugees are* individuals who are outside of their countries of origin and are facing persecution for reasons related to their "race, religion, nationality, membership of a particular social group or political opinion." Most environmentally-displaced people would disqualify for refugee status because they are predicted to remain within their countries of origin, and even those who flee will not be able to claim refugee status because the definition does not recognize the "environment" as a reason.
[45] Black, Richard. "*Environmental refugees: myth or reality?* New Issues in Refugee Research." UNHCR, Working Paper 34. 2001. Access at < http://www.unhcr.org/research/working/3ae6a0d00/environmental-refugees-myth-reality-richard-black.html>
[46] *Ibid*.
[47] Bates, Dane. "Environmental Refugees? Classifying Human Migrations Caused by Environmental Change." *Population and Environment* 23, no. 5 (2002): 465-477.

migration. Dun's concern is that the most anticipated environment-related displacement is slow-onset change, which impacts people's livelihoods and causes them stress. As such, environmental factors are contributing factors rather than the major factor in movement, thus making it difficult to establish direct causality and formulate a definition.

Link between Displacement and Environmental Change

A more contentious debate than how to identify and define the people who are displaced by environmental change is the linkage between displacement and an increasingly changing environment. There are two isolated schools of thoughts that are generally cited: the "alarmists" and the "skeptics."[48] The former, which includes Myers, Shurke and El-Hinnawi, and Bates insist on denoting environmental change as a major driving force of migration. For them, environmental issues force people to move, and there is an urgent and exacerbating crisis of environment-related displacement that must be addressed. The skeptics, however, look at the complexity of the link between movement and environmental issues. Two skeptics, Castels and Lee, find that migration is a complex pattern in which natural and environmental factors are closely linked to economic, social and political ones in terms of causality.[49]

With regard to slow-onset environmental degradation, displacement is linked to the depletion of both land and water resources, deforestation, desertification and pollution. The IPCC has noted that the greatest effect of climate change may be on human migration as millions of people are displaced due to slow-onset environmental change such as shoreline erosion, coastal flooding

[48] Ferris, Elizabeth. "Climate Change is Displacing People Now: Alarmist Vs. Skeptics." The Brookings Institute. 2014. Access at < https://www.brookings.edu/blog/planetpolicy/2014/05/21/climate-change-is-displacing-people-now-alarmists-vs-skeptics/>
[49] Castels, Stephan. "Environmental change and forced migration: making sense of the debate." UNHCR, working Paper 70.2002. Access at < http://www.unhcr.org/research/working/3de344fd9/environmental-change-forced-migration-making-sense-debate-stephen-castles.html>

and agricultural disruption.[50] Brown argues that all of these rapidly changing climatic conditions will erode livelihoods, likely causing population movement by making certain parts of the world less viable places to live. In these conditions, migration can be seasonal, circular, permanent or temporary, depending on the nature and severity of the environmental conditions.

As the world is expected to be, on average, between 1.8 and 4 degrees Celsius hotter in 2099, slow-onset environmental changes such as decreased rainfall and increased heatwaves are expected to occur with increasing severity. [51] The rising of sea levels and the flooding of coastal communities will have severe implications on food security and economic growth.[52] Myers anticipates a one-meter rise in sea levels to displace anywhere between 13 to 40 million individuals.[53] According to the IPCC's fourth assessment report, agricultural production also will be severely compromised as growing seasons and yield potentials are expected to decrease. Farmers in the Sahel region of Africa living in warmer and drier conditions have already curtailed their cropping seasons.[54] The IPCC predicts a 50 per cent decrease in rain-fed agriculture in certain parts of Africa by 2020 and a 30 per cent decrease in agriculture yields in Central and South Asia by 2050.[55] These insecurities will likely push people to migrate for improved livelihoods.

[50] Lonergan, Steve. "The Role of Environmental Degradation in Population Displacement." *Environmental Change and Security Project Report*, 4 (1998): 5-15
[51] IPCC, 2001: Climate Change 2001: the scientific basis. Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change, edited by J. T. Houghton, Y. Ding, D. J. Griggs, M. Noguer, P. J. van der Linden, X. Dai, K. Maskell and C. A. Johnson (eds). Cambridge University Press, Cambridge, UK, and New York, USA, 2001.
[52] Brown, Oli and Alec Crawford, "Rising Temperatures, Rising Tensions: Climate Change and the Risk of Violent Conflict in the Middle East" International Institute for Sustainable Development. 2009. Access at < http://www.iisd.org/library/rising-temperatures-rising-tensions-climate-change-and-risk-violent-conflict-middle-east>
[53] "Environmentally Displaced People." Oxford Refugee Studies center. 2011. Access at < https://www.rsc.ox.ac.uk/policy/environmentally-displaced-people> ; Brown, Lester. "Troubling new Flows of Environmental refugees." Earth Policy Institute. 2004. Access at <http://www.earth-policy.org/plan_b_updates/2004/update33>
[54] IPCC, 2014: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA
[55] *Ibid.*

The implications of climate change for population movement are more straightforward when it comes to sudden weather events such as hurricanes and typhoons. Brown argues that natural disasters could displace large numbers of people for relatively short periods of time, but the slow-onset drivers are likely to permanently displace more people. A 2014 study by the Oxford Refugee Center found that environmental vulnerability in Kenya, Ghana and Vietnam resulting from great climatic variations has increased internal and external displacement. Ghana and Kenya have witnessed widespread and frequent droughts, floods and strong storms that have led to large-scale population displacement. Between 1982 and 2008, around 4 million people were affected by droughts in Kenya. Vietnam is particularly threatened by rising sea levels and saline water intrusion, especially given that a large proportion of the population lives in low elevation coastal zones. Furthermore, the Mekong Delta accounts for 50 per cent of Vietnam's rice production and a larger proportion of its fishing production.[56] As mentioned in my Introduction, climate change in Iraq has produced severe and frequent droughts in recent years, which have threatened thousands of people, particularly farmers and animal herders in the southern region.

In addition to the notion that environmental degradation and dwindling natural resources cause a loss of livelihoods and subsequent migration, Kolmannskog and Trebbi argue that sudden-onset and slow-onset natural disasters can trigger conflict through competition over scarce resources.[57] For example, UNEP listed the erosion of natural resources caused by climate change among the root causes of the Darfur tragedy. Drastic declines in rainfall had turned grazing land into desert, destroying the livelihoods of pastoralist societies and forcing them to move further south to find

[56] Roger Zetter and James Morrissey, "Environmental stress, displacement and the challenge of rights protection," *Forced Migration Review* 45, (2014): 65-71.
[57] Kolmannskog, Vikram and Lisetta Trebbi, "Climate change, natural disasters and displacement: a multi-track approach to filling the protection gaps," *International Review of the Red Cross,* 92, no. 879 (2010): 713-730.

new pastures. They moved to areas already populated with other communities, creating tensions over dwindling resources, and contributing to eventual conflict.

On the other hand, Black is skeptical of the notion that environmental degradation is increasingly at the root of conflicts that induce refugee flows; arguing that, since the 1990s, conflicts that have caused large-scale forced migration provide little evidence of environmental "hotspots'' that developed into war. In fact, he contends that conflicts are over controlling abundant wealth-creating natural resources.[58] For Black, it's difficult to isolate migration from broader contexts in which conflict is created. Thus, a simple causal link between environmental degradation, conflict and migration is unlikely to be found.

As Brown emphasizes, alongside climatic factors, equally important are the non-climatic factors that condition a community's vulnerability to climate change, including its exposure to climatic conditions and the community's adaptive capacity. Migration requires financial and social capital. Therefore, communities do not choose to immediately migrate when their environment changes but they find alternative ways of adopting to environmental changes. When all options are exhausted, they migrate. Lonergan agrees and further adds that only through a structural understanding of the environment's political and cultural context in a region or country can "one begin to understand the "role" [the degradation of the environment] plays as a factor in population movement."[59] In other words, the implications of environmental change on different countries varies and the displacement it may induce depends on the country's political, economic and social context. McLeman and Smit add that it is necessary to question whether a community

[58] Richard Black, "*Environmental refugees: myth or reality?* New Issues in Refugee Research, "Working Paper 34, 2001.
[59] Steve Lonergan (1998), "the Role of environmental degradation in population displacement," *Environmental change and security project report*, issue 4. 1998. pg. 8.

has adaptive strategies when vulnerable to climate change. If communities or their institutions are unable to cope with a changed environment, individuals remain vulnerable, and may be obliged to implement their own adaptive strategies including migration.[60]

As Germenne argues, migration can be viewed as a coping strategy to adapt to climate change. People who are affected by changing weather conditions will have to leave their environments that are no longer suitable in search of new ones.[61] Brown asserts that rural to urban migration can hinder a community's development and resilience to climate change by exerting pressure on urban infrastructures and services and undermining economic growth. This can increase the risk of conflict and lead to deteriorating health and social indicators among migrants themselves.

Water Scarcity and Displacement

Displacement scenarios that are linked to water problems consist of both sudden-onset disasters and slow-onset environmental events. On the one hand, sudden-onset events such as monsoon floods, glacial lake outburst floods, storms, hurricanes and typhoons force people out of their land quickly and dramatically.[62] Examples of these events include hurricanes Katrina and Rita which hit the Gulf Coast of the US in August and September 2005 forcing around two million people out of their homes.[63] One the other hand, slow-onset events which include rising sea levels, salinization of freshwater and arable land, dwindling water resources, and droughts displace people sporadically and more permanently than sudden-onset even, over longer periods

[60] Robert McLeman and B Smit, "Migration as an Adaptation to Climate Change." *Climate Change*, 2006.
[61] Gemenna, Francois, "Migration, a possible adaptation strategy?" *IDDRI,*. 2010. Access at < Migration, a possible adaptation strategy?">.
[62] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>
[63] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>

of times.[64] In the case of the Horn of Africa, erratic and below average rainfall has resulted in widespread water and food insecurity and deteriorating livestock conditions forcing thousands of people to be displaced, within and across borders. Droughts and subsequent food insecurity in Somalia have been linked to the displacement of nearly 700,000 people internally and 2,000 Somalis have crossed the Somali borders to neighboring Kenya in 2017.[65] In cases of droughts and desertification, people will have no choice but to leave their homes. While there is a tipping point for these slow-onset disasters, many people decide to leave in anticipation of the worse-to-come and to improve their economic situation.[66] Further, drivers to migrate, internally or internationally, are infused with other vulnerabilities, such as poverty and issues of underdevelopment. Displacement as a result of water-related issues can occur at different stages of climate change and in different ways.

Environmental degradation and displacement should be understood as interrelated phenomena caused by multiple international, internal and transnational factors. These factors interplay with preexisting vulnerabilities such as development capacity and poverty, which exacerbate and expedite the depletion of natural resource such as water. It is indeed, as Burkett argues, hard to "'[T]ease out' climate impacts from other input with complete precision".[67]

[64] *Ibid.*; and Burkett, Maxine. 2018. "Justice and Climate Migration: the importance of nomenclature in the discourse on twenty-first-century mobility" in *Climate Refugees? Beyond the Legal Impasse* eds. Simon Behrman and Avidan Kent (Earthscan from Roughtledg London and NY, 2018) 73.
[65] Akumu, Olivia and Bram Fram Frouws. "Drought: A Contribting or Limiting Factor in Migration?" Regional Mixed Migration Secretariat. 2017. Access at <https://reliefweb.int/sites/reliefweb.int/files/resources/Drought_%20A%20contributing%20or%20limiting%20factor%20in%20migration_.pdf >
[66] Burkett, Maxine. 2018. "Justice and Climate Migration: the importance of nomenclature in the discourse on twenty-first-century mobility" in *Climate Refugees? Beyond the Legal Impasse* eds. Simon Behrman and Avidan Kent (Earthscan from Roughtledg London and NY, 2018) 73
[67] Burkett, Maxine. 2018. "Justice and Climate Migration: the importance of nomenclature in the discourse on twenty-first-century mobility" in *Climate Refugees? Beyond the Legal Impasse* eds. Simon Behrman and Avidan Kent (Earthscan from Roughtledg London and NY, 2018) 73

Available data on environmental degradation and migration insufficiently explain the link between displacement and environmental issues and make appropriate responses difficult.[68] More data and research that unpacks the complexity of environmentally-induced displacement is needed. To contribute to the understanding of this phenomena, this thesis examines environmentally-induced displacement by examining the issue of water scarcity in southern Iraq to emphasize the complexities of environmental change and displacement, looking at local, transnational and international causal factors and how they interplay.

[68] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>

Chapter Two: A Brief History of Water in Lower Mesopotamia from Ancient Times to the Present Day

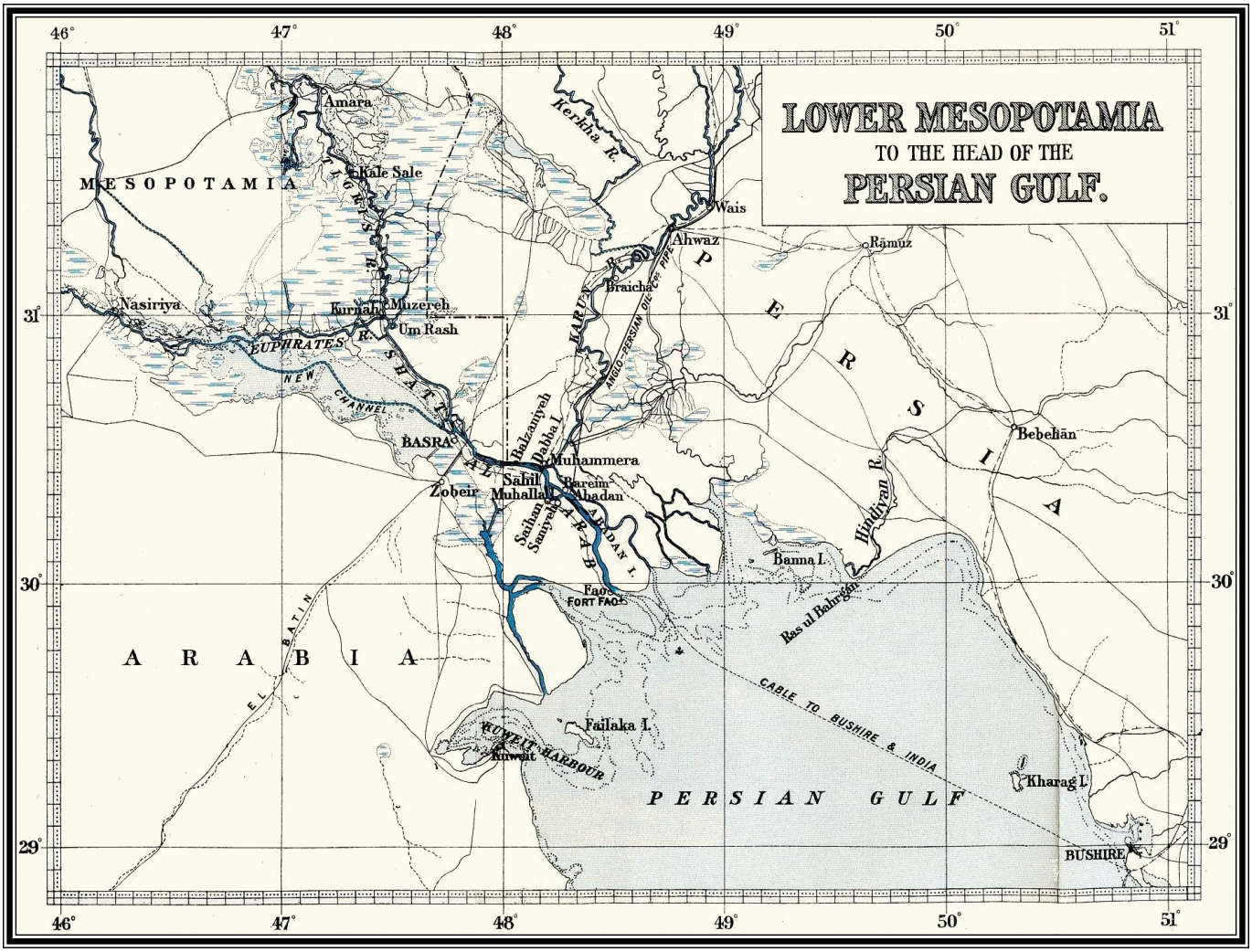
Introduction

This Chapter traces the history of water resources in southern Iraq from ancient Mesopotamia to modern times. It provides a historical background, describing how the water situation in Iraq had periodically been linked with displacement through climate change, urbanization, internal water management policies, and as such contemporary challenges are not wholly unprecedented.

On the Tigris and the Euphrates

Southern Iraq is home to the earliest civilization in the world: Sumer.[69] The region, Mesopotamia, or the land between the Tigris and the Euphrates Rivers takes its name from two Greek words, *Mesos* meaning 'middle' and *potamos* for 'river.[70] Geographically, Mesopotamia is the land between the Zagros and Anti-Tarus mountains in the north and the Arabian plateau and the Arab-Persian Gulf to the south.[71] The focus of this Chapter, lower Mesopotamia, extends from Nippur (94 miles to the south of modern day Baghdad) to Ur and the Arab-Persian Gulf (see Map 1 for a close-up of lower Mesopotamia).

[69] Foster, Karen and Foster Benjamin. *Civilizations of Ancient Iraq.* Princeton University Press, 2009.
[70] Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51
[71] *Ibid*.



Map 1 Lower Mesopotamian Civilization highlighting ancient cities and present-day governorates [72]

The Euphrates and Tigris basin originates in one climatic zone and ends in a different one.[73] Both rivers arise out of the mountains of southern Turkey and meet in extensive lowlands in the south and east of the Arab-Persian Gulf. The Euphrates River is formed by the confluence of the Kara Su or Western Euphrates and the Murat Su or Eastern Euphrates in southeastern Turkey,

[72] Retrieved April 15, 2018 *from* <http://www.naval-history.net/WW1Book-RN1-394.jpg>
[73] The Euphrates is longer than the Tigris measuring at 2,700 km making it the longest river in southwest Asia while the Tigris is 1,840 km in total. The Euphrates average annual flow as measured at Hit is 32 billion cubic meters while the Tigris is 40 BCM. *See:* [73] Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51

while the Tigris River rises amid the snow-covered Taurus Mountains of eastern Turkey.[74] When the two rivers emerge from the Taurus Mountains in southern Turkey, they are separated from each other by about 400 km and meet again at Al-Qurnah, 100 km north of Basra to form, along with the Karun River, Shatt Al-Arab, as show in Map 2.[75]

Map 2 The Tigris and Euphrates Basin from where they rise in Turkey to Shatt Al-Arab where the two rivers meet [76]

In lower Mesopotamia, the two rivers flow at a low gradient; as a result, numerous side branches form and the rivers overflow creating permanent lakes and marshes and occasionally changing

[74] Caressy, George. "The Shatt Al-Arab Basin" *Middle East Journal* 12, no. 4 (1955): 448-460.
[75] Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51
; Morozova, Galina. "A Review of Holocene Avulsions of the Tigris and Euphrates Rivers and Possible Effects on the Evolution of Civilizations in Lower Mesopotamia." *Geoarchaeology: An International Journal* 20, no. 4 (2005): 401-423.
[76] Retrieved April 15, 2018 *from* http://ehsworldstudiesjackoboice.wikispaces.com/Mesopotamia+-+Tigris-Euphrates+River+Valley+(Current+Events

their courses.[77] While data on when and in what ways the shape of lower Mesopotamia has changed overtime is inconclusive, archeological evidence show that before 14,000 B.C. the two rivers reached the Gulf separately.[78] In the past, the shoreline was situated more than 200 sq. km farther inland than it is today.[79] However, at the height of the last Ice Age, global sea levels began to rise beginning around 14,000 B.C. and the alluvium deposited by the rivers gradually enlarged the deltas of the two rivers which led to the growth of the rivers' deltas leading to their merging in Shatt Al-Arab.[80] The next section explores the ways in which the rivers were used in ancient Mesopotamia, and how one of the oldest and most complex irrigation systems was developed in lower Mesopotamia.

The Ancient Crucible: Lower Mesopotamia

Mesopotamia's history is deeply linked with water. The two rivers shaped the society of ancient Mesopotamia, especially its southern part (see Map 3). The large environmental differences between northern and lower Mesopotamia divided ancient Mesopotamia into two parts: the northern plain of Assyria characterized by mountains and an arid climate and the southern Babylonian alluvium.[81] Lower Mesopotamia is described as an alluvial plain where irrigation-based agriculture developed and flourished. This irrigation system supported a large agricultural community that led to the formation of the first city-states in the world around 6000 years ago.[82]

[77] Roux, Georges. *Ancient Iraq.* Allen & Unwin, 1964.
[78] McIntosh, Jane R, *Ancient Mesopotamia: New Perspectives.* ABCOCLIO, Santa Barbra, Denvor, Oxford, 2005.
[79] Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51.
[80] McIntosh, Jane R, *Ancient Mesopotamia: New Perspectives.* ABCOCLIO, Santa Barbra, Denvor, Oxford, 2005; Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51.
[81] McIntosh, Jane R, *Ancient Mesopotamia: New Perspectives.* ABCOCLIO, Santa Barbra, Denvor, Oxford, 2005.
[82] *Ibid*.

The Rise of Lower Mesopotamia (around 6,500 to 3,000 B.C.)

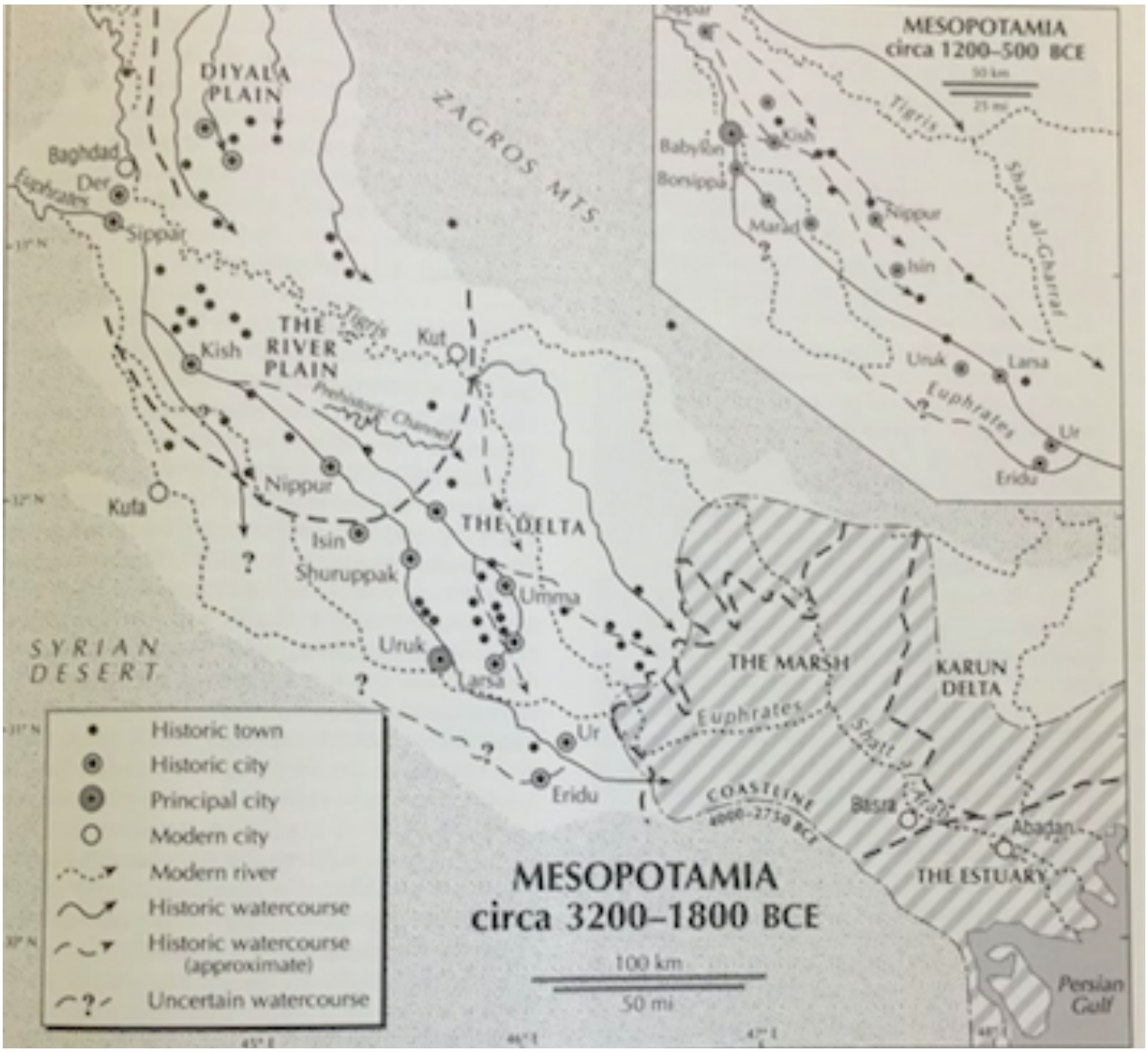
Lower Mesopotamia was essentially formed by huge deposits of silt carried by the Euphrates and the Tigris Rivers. As a vast flood plain, the region faced constant floods between April and June that were too late for winter crops and too early for summer ones.[83] The climate in the region was dry and received little rainfall to enrich the soils despite its flat plains. In order to ensure appropriate water supply to the agricultural fields, a complex and intricate system of canals and dykes was developed by ancient Sumerians to control water and adapt to their environment.[84] Mesopotamia's well-documented archaeological and textual record on ancient water reveals that states between the sixth and the first millennium B.C. in ancient Mesopotamia had heavy involvement in irrigation and water management.[85] Irrigation in lower Mesopotamia provided subsistence for small communities and later became the economic basis for states and empire.[86] Archeological studies show that throughout the history of Mesopotamia, natural causes and the states' manipulations of Mesopotamia's irrigation system impacted lower Mesopotamia's water resources and its people.[87]

During the Ubaid period (around 6,500 to 3,800 B.C.), villages and small towns grew where irrigation agriculture was controlled by small, temple-centered societies with little centralization of agricultural surplus. The following Uruk period (around 4,000 to 3,000 B.C.) marks a transition from chiefdom to state whereby urbanization flourished in Sumer.[88] Large scale agricultural communities began to emerge moving beyond just subsistence farming by producing

[83] Aldo, Tamburrino. "Water Technology in Ancient Mesopotamia." In *Ancient Water Technologies,* ed. Larry Mays (Springer, Dordrecht) 25-51
[84] El-Yussif, Faruk. "Condensed History of Water Resources Developments in Mesopotamia." *Water International* 8, no. 1 (1983): 19–22.
[85] Rost, Stephanie. "Water management in Mesopotamia from the sixth till the first millennium B.C." *WIREs Water* 2017, 4:e1230. Doi:10.1002/wat2.1230.
[86] Rost, Stephanie and Hamdani Abdulamir. "Traditional Dam Construction in Modern Iraq: A Possible Analogy ofr Ancient Mesopotamian Irrigation Practices." *British Institute for the Study of Iraq* Vl. LXXIII (2011): 201-221.
[87] Brinkman, JA. "A Preliminary Catalogue of Written Sources for a Political History of Babylonia: 1160-722 B.C." *Journal of Cuneiform Studies* 16 (1962): 83-109.
[88] Weiss, H. "Megadrought and the Akkadian Collapse." In Harvey Weiss, *Megadrought and Collapse: From Early Agriculture to Angkor* (Oxford University Press, 2017). 4.2.

surpluses, diversifying social and economic activities, and living in large numbers of collective communities.[89] Notably, the emergence of these cities was dependent upon nearness to a dependable water supply and trade routes. During the Uruk period, the Sumerians built the cities of Erudi, Kish, Lagash, Nippur, Ur, Uruk and Susa, giving rise to the Sumerian civilization.[90] Sumer was located in the southern part of lower Mesopotamia, stretching 50 miles south of modern day Baghdad to Basra.[91] By 3,000 B.C., the Sumerians had established a civilization with thriving urban centers. An integral part of the Sumerians ability to establish these centers was their highly developed and well-maintained irrigation system and water management techniques (see Map 3 to identify Mesopotamian cities and watercourses). Cities of lower Mesopotamia were characterized by a highly organized and efficient agricultural system supported by their irrigation network. People and their agricultural production faced massive regional drought and man-made diversion of water courses during the following periods, that left many lower Mesopotamian cities abandoned and induced displacement.

[89] Leick, Gwendolyn. *Mesopotamia: The Invention of the City*, Penguin, UK, 2001.
[90] Whyte, Ian. *A Dictionary of Environmental History.* 1st ed. I.B. TAURIS, 2013.
[91] Woolley, Leonard. *The Sumerians.* 1st ed. Clarendon Press, 1928.



Map 3 Mesopotamia 3200-1800 B.C., identifying the different environmental regions, probable watercourse and coastline, and the location of contemporary towns. [92]

Droughts, Displacement and the Collapse of the Akkadian Empire (around 2324 to 2206 B.C.)

The first empire that consolidated power throughout Mesopotamia was the Akkadian empire.

The Akkadian Empire ruled Mesopotamia from the headwater of the Euphrates and the Tigris to

[92] Butzer, Karl. "Environmental Change in the Near East and Human Impact on the Land" in eds. Jack Sasson, *Civilizations of the Ancient Near East* (Charles Scribner's Sons, 1995) pp. 134–138

the Arab-Persian Gulf during the late 3rd millennium B.C.[93] The Akkadian Empire was able to expand in lower Mesopotamia by controlling, managing and governing Mesopotamian irrigation systems, especially lower Mesopotamia.[94] The empire sustained itself and thrived economically on long-distance trade and massive agricultural projects sustained by a large network of irrigation canals. The Akkadian military power was large and strong, bolstering distant imperial fortresses and repressing rebellions locally.[95] An abrupt and severe drought, however, caused the collapse of the Akkadian Empire based in lower Mesopotamia. This severe drought desiccated agriculture landscape of the Mediterranean, West Asia and Mesopotamia.[96] Reduction in water flow greatly diminished canal length and irrigated field areas in lower Mesopotamia. Scholars have attributed this drought to an abrupt and severe change in climate conditions. DeMenocal explains that, "[T]here was an influence of the North Atlantic Oscillation on the stream flow of the Tigris and Euphrates at this time, which led to the collapse of the Akkadian Empire."[97] Water levels within the Tigris and Euphrates fell 1.5 meters below the levels of 2600 B.C.[98] Weiss argues that the drought and loss of agricultural land led to massive displacement in lower Mesopotamia, and the departure of most of the population in the region. As a result, "major urban settlements and their surrounding towns and villages were abandoned synchronously and completely."[99] This period was followed by an approximately 250-year abandonment of the region, until the return of the pre-drought precipitation.[100] This population movement in lower Mesopotamia and the subsequent population doubling following the drought generated the

[93] Weiss, H. "Megadrought and the Akkadian Collapse." In Harvey Weiss, *Megadrought and Collapse: From Early Agriculture to Angkor* (Oxford University Press, 2017). 4.2.
[94] *Ibid*.
[95] *Ibid*.
[96] *Ibid*.
[97] deMenocal, Peter. "North Atlantic Influence on Tigris-Euphrates Streamflow" *International Journal of Climatology* 20, no. 8 (2002): 853-863.
[98] Peter, Christie. *The Curse of Akkad: Climate Upheavls that Roched Human History.* Annick Press, 2008. Pg. 31-48.
[99] Weiss, H. "Megadrought and the Akkadian Collapse." In Harvey Weiss, *Megadrought and Collapse: From Early Agriculture to Angkor* (Oxford University Press, 2017). 4.2.
[100] *Ibid*.

hypertrophic Ur III dynasty cities along the Euphrates River where urban settlement flourished once again.[101]

Resettlement and Water Resource Management in Ancient Lower Mesopotamia (around 2094 to around 1340 B.C.)

Water management was an integral component of governance in ancient Mesopotamia and the re-establishment of the cities after the Akkadian Empire collapse. Governing and managing watercourses and the overall irrigation system was an integral part of governing the growing cities in lower Mesopotamia, especially since water was treated as a communal, rather than an individual asset.[102]

During the Ur III period (around 2113 to around 2006 B.C.), the best documented era in antiquity, lower Mesopotamia had one of the most efficient and well-managed water systems in the world to date.[103] Archaeological evidence shows that at the time of the Ur III period and throughout Mesopotamian history in general, arable land was nominally owned by the state; private ownership was of marginal importance, albeit not ruled out.[104] The management of arable land and water infrastructure was managed directly by local state institutions in a centralized manner with a hierarchy of administrators.[105] This continued under the rule of Hammurabi (1792 to 1750 B.C.), the sixth king of the first Babylonian Dynasty, who united all of the Sumerian cities were united with Babylon as their capital. During the time of Hammurabi, irrigation system was prosperous. Controlling water courses and maintaining the water management was

[101] Adams, R. *Heartland of Cities.* Chicago: University of Chicago Press, 1981.
[102] Rost, Stephanie. "Water management in Mesopotamia from the sixth till the first millennium B.C." *WIREs Water 2017*, 4:e1230. Doi:10.1002/wat2.1230.
[103] Kornfeld, Itzchak E. "Mesopotamia: A History of Water and Law." in eds, Dellapenna and Gupta Joseph *The Evolution of the Law and Politics of Water*, (Springer, Dordrecht, 2009) 21-36.
[104] *Ibid.*
[105] *Ibid.*

particularly critical for maintaining the most important religious and administrative centers. He undertook major dredging on the Euphrates River channels to restore water flow to cities following the droughts and was directly involved in the management of the rivers' water supply.[106]

One of the ways in which the irrigation system in Mesopotamia was governed was through irrigation and water laws. Mesopotamia developed a system of customary and established water laws to manage its watercourse and impose of liability upon those who failed to safeguard irrigation canals, and thereby causing flood damage.[107] Hammurabi formulated 300 codes which dealt with different aspects of irrigation. An illustrative example of these codes addresses the maintenance of the canals:

> If a man is negligent in strengthening the banks of this field and has not maintained his banks and then a breach has occurred in this bank and so he has let the waters carry away (the soil on) the waterland, the man in whose bank the breach has occurred shall replace the corn which he has (caused to be) lost.[108]

While the irrigation system and water was well-maintained during the Hammurabi era, diversion of water courses and subsequent droughts threatened the land and people in certain parts of lower Mesopotamia once again in the later years. During the first Sealand Dynasty (1739-1340 B.C), the Tigris River was dammed somewhere south of Mashkan-Shapir (30 km north of Nippur and 140 km southeast of modern-day Baghdad) in response to rebellions in the south. As a result, the Tigris shifted its course east from Nippur and the alluvial plain between Nippur and Uruk was mostly abandoned. The population abandoned their settlements, agricultural and irrigation

[106] *Ibid.*
[107] Kornfeld, Itzchak E. "Mesopotamia: A History of Water and Law." in eds, Dellapenna and Gupta Joseph *The Evolution of the Law and Politics of Water*, (Springer, Dordrecht, 2009) 21-36.
[108] Kornfeld, Itzchak E. "Mesopotamia: A History of Water and Law." in eds, Dellapenna and Gupta Joseph *The Evolution of the Law and Politics of Water*, (Springer, Dordrecht, 2009) 21-36.

activities creased as the canal systems collapsed, and silt and sand accumulated in the canals.[109] The Tigris and Euphrates Rivers witnessed drastic changes during the first Sealand Dynasty as a result of the damming. The Tigris and Euphrates river bed moved from the heart of the alluvial plain. The Tigris moved to the east of Nippur and ran in a new course, while the Euphrates flowed at the extreme western portion of the plain and flowed to the west of Uruk and Eridu.[110] Controlling and manipulating water courses in Mesopotamia continued to be a critical tactic that foreign invaders employed to assume control over lower Mesopotamia in the years to come. This had detrimental implications on the land and people of lower Mesopotamia.

The Persian Empire, the Arabs, the Mongols and the Ottomans (539 B.C. to 1918)

The canal system in lower Mesopotamia faced ongoing upheavals and at times destruction as invaders assumed control over Mesopotamia. The first Persian Empire, the Achaemenid, extended from the Balkans and Eastern Europe in the west to the Indus Valley in the East.[111] Between 226 to 637 A.D, the successors of the Persian Achaemenids, the Sasanian Dynasty of Persia, assumed control over Mesopotamia.[112] The irrigation system in Mesopotamia underwent a major overhauled by the Sasanians and was comprised of a lattice of intersecting canals enclosing a geometric basin.[113] The Sasanians altered the canal system, specifically in the lower Diyala Plain, by constructing two new large canal systems; the first was 50 km long stretching from the right bank of the Diyala River and ending near Ukbara; the second one, the Nahrwan or

[109] De Mieroop and Van, M. "Reed in the Old Babylonian texts from Ur." In *Bulletin on Sumerian Agriculture* (6 Trees and Timber in Mesopotamia, Cambridge, 1992): 147-153.
[110] Hamdani, Abdulameer. "Shadow states: The Archology of Power in the Marshes of Southern Mesopotamia." PhD Dissertation, Stony Brook University, 2011.
[111] Christensen, Peter. *The Decline of Iranshahr: Irrigation and Environments in the History of the Middle East 500 B.C.. to A.D. 1500.* Museum Tusculanum Press, 1993
[112] Montakab, Sophia, "Irrigation Management in Ancient Iran: A Survey of Sasanian Water Politics." *University of California, Irvine.* 2013. Access at < https://www.sasanika.org/wp-content/uploads/GardPaper8-MontakabSasanikaWater1.pdf>.
[113] Christensen, Peter. *The Decline of Iranshahr: Irrigation and Environments in the History of the Middle East 500 B.C.. to A.D. 1500.* Museum Tusculanum Press, 1993

Katul-I Kisrawi, supplemented the Diyala River flow with water from the Tigris at Dour.[114] In response to sprawling settlements alongside new canals, the Sasanians enacted a new pattern of development resettling populations from the canals to new 'virgin land' close to Tell Abu Sarifa, near Nippur.[115]

The Sasanian forces lost Mesopotamia to the Arab army. In 636 CE at the battle of Madar, Sasanian forces completely lost southern Mesopotamia to the Arab army. [116] The Muslim Arabs, specifically during the Abbasid Caliphate, who conquered lower Mesopotamia in 637 also paid great attention to irrigation projects in lower Mesopotamia, such as those on the Nahrawan canal on the Tigris and its branches.[117] However, sedimentation in areas close to the Nahrawan and unsuccessful irrigation attempts forced farmers to move farther along the water routes shifting from areas near Nahrawan to areas farther away.[118] Farmers' livelihoods were threatened with the disruption of the irrigation system and were forced to move to adjust to the changing water conditions.

By 1258, the Mongols established their control over Baghdad and the south of it destroying much of the physical structure of Baghdad and demolishing the highly developed irrigation system. This led to a loss of agricultural life throughout lower Mesopotamia and had implications on population movement.[119] After the degradation of the canal system that was the main source of wealth in Mesopotamia, the country became a scene of rivalry for domination

[114] El-Yussif, Faruk. "Condensed History of Water Resources Developments in Mesopotamia." *Water International* 8, no. 1 (1983): 19–22.
[115] Simpson, SJ. 2000. "Mesopotamia in the Sasanian Period: Settlement patterns, art and craft," in *Mesopotamia and Iran in the Parthian and Sasanian Period: Rejection and Revival c. 238 BC-AD—Proceedings of a Seminar in Memory of Vladimir G. Lukkonin,* ed John Curtis (London: British Museum Press, 2000), 57-66.
[116] "Sasanian Empire." Ancient History Encycopedia. 2013. Access at < https://www.ancient.eu/Sasanian_Empire/>.
[117] El-Yussif, Faruk. "Condensed History of Water Resources Developments in Mesopotamia." *Water International* 8, no. 1 (1983): 19–22.
[118] *Ibid.*
[119] Lebon, J. H. G. "The New Irrigation Era in Iraq." *Economic Geography* 31, no. 1(1955): 47–59.

between the Mongols, Persians and then the Ottoman Turks. Irrigation was to remain a neglected field from the Mongol conquest in 1258. The irrigation system was restored in 1911 with W.Willock's report on irrigation development and the subsequent establishment of the Department of Irrigation in 1918 which was tasked with designing and constructing new irrigation projects.[120]

Britain Cruises in Mesopotamian Water

Throughout most of the 19th century, steamships became the main mechanism for British imperialism in southern Iraq. In 1829, there was a renewed interest in establishing a route between Britain and India that cuts across the Mediterranean and down the Euphrates River to the Arab-Persian Gulf.[121] This route would ease transport for the British between their Eastern colonies and the West making it more logistically convenient for the British to colonize. At that time, Iraq, for the British was a preemptive buffer zone protecting India from Russia and France. Thus, the Tigris and Euphrates were means for both expanding trade and protecting British colonies.

In the early 1800s, the British began conducting surveys in Mesopotamia including its canal system to find possible routes through Mesopotamia "based upon a more extended and beneficial commerce to [the British] and their eastern colonies, and to Arabia."[122] A British lieutenant, H.B Lynch, established a commercial house in Baghdad and, subsequently, a river transport enterprise on the Tigris. The Turkish Ottoman government in charge at the time of the

[120] El-Yussif, Faruk. "Condensed History of Water Resources Developments in Mesopotamia." *Water International* 8, no. 1 (1983): 19–22.
[121] Zaki, Saleh. *Mesopotamia (Iraq): A Study in British Foreign Affairs 1600-1914*. Baghdad, Iraq: Al-Ma'aref Press, 1957.
[122] *Ibid.*

establishment of the Lynch company allowed the British steamers to navigate the Euphrates River for commercial purposes.

Navigating the Mesopotamian waters for economic, commercial and trade purposes, including oil, was materialized in an agreement between the British and the Turks. An Anglo-Ottoman agreement signed in 1913 legalized the concessions of the Euphrates and Tigris Steam Navigation Company and formed the Ottoman River Navigation Company, under the leadership of the Chairman of the British Indian Steam Navigation Company. The Company was given the right to navigate, operate and survey the Mesopotamian rivers from the Arab-Persian Gulf to northern Mesopotamia, and allowed the construction of the Baghdad Railway down to Basra.[123] In 1914, a British naval ship penetrated Shatt Al-Arab, subjugated lower Mesopotamia, and within less than 20 days occupied the entire strategic maritime city of Basra.[124] This event marked an end to Ottoman Mesopotamia and the beginning of the Hashemite Kingdom of Iraq under the Mandate System.

Between 1914 to 1918, World War One took place between the world's economic powers: the Allies that consisted of European countries, the United Kingdom, the United States, and Japan, and the Central Powers of Germany, Austria-Hungry, Ottoman Empire and Bulgaria.[125] At the end of World War One, the victorious Allied Powers met at the Paris Peace Conference in 1919. The territories that were under the sovereignty of the Ottoman and German Empires that had been defeated in WWI were divided into three categories—A, B and C—based on their degree of

[123] Pears, Edwin. "Turkey and the War," *Contemporary Review,* 106 (1914): 589-597.
[124] "British Cruisers in Iraq Waters," T*he Times of India (1861-Current).* 1946. July 23, 1946.
[125] Tilly, Charles. Review of *Century of War: Politics, Conflicts, and Society Since 1914*, by Gabriel Kolk *Political Science Quarterly* 110, no. 4 (1995): 637-638.

"civilization" and distributed among the Allied powers.[126] Iraq was regarded as an A category and placed under the trusteeship of Britain as a mandate of the League of Nations.[127]

The Mandate System in Iraq (1921 to 1932)

Under the oversight of the League of Nation's Permanent Mandate Commission, Britain was to turn Iraq into a modern self-determinant state and promote "well-being and development."[128] In doing so, while securing Britain's economic and political interest, the British appointed Faisal Ibn Hussein as King of Iraq in 1921 and proceeded to assume control through the Anglo-Iraqi treaty[129] over Iraq's financial and military affairs as well as Iraq's constitution.[130] During the mandate period, major oil explorations were undertaken after the discovery of huge oil deposits in Iraq. The Iraqi Petroleum Company, controlled by British, French, American and Dutch interests, was created in 1925 and had virtual monopoly over all oil production in Iraq.[131] In 1932, Iraq gained formal independence from the British Mandate. A period of unrest and multiple coups occurred between 1932 and 1958. Abdel karim Qasim seized power in the July 14 Revolution of 1958 effectively eliminating the Iraqi monarchy and establishing the Republic of Iraq.[132] Until 1958, the role of the government in agriculture was limited to water control structure on major rivers. That changed in 1958 when the government became more involved in the organization of the rural economy and society; and the resources from oil enabled the government to be a major investor in the provision of water and agricultural services. The role of the government in water and agricultural services grew in the following decades.[133] The

[126] Antony Anghie. "The War on Terror and Iraq in Historical Perspective." *Osgoode Hall L.J.* 43, no. 1 & 2 (2005): 45-66
[127] The League of Nations was created in 1920 as a result of the Paris Peace Conference and ceased to exist in 1949. It was then replaced by the United Nations.
[128] Antony Anghie. "The War on Terror and Iraq in Historical Perspective." *Osgoode Hall L.J.* 43, no. 1 & 2 (2005): 45-66.
[129] An agreement signed by the government of the United Kingdom and the government of Iraq in 1922.
[130] Antony Anghie. "The War on Terror and Iraq in Historical Perspective." *Osgoode Hall L.J.* 43, no. 1 & 2 (2005): 45-66
[131] Brown, Michael. "The Nationalization of the Iraqi Petroleum Company." *International Journal of Middle East Studies* 10, no. 1 (1979): 107-124.
[132] Abdullah, Thabit. *A Short History of Iraq.* 2nd ed. Routledge, 2010.
[133] "Iraq: Country Water Resource Assistance Strategy: Addressing Major Threats to People's Livelihoods.". The World Bank. 2006. Access at <http://documents.worldbank.org/curated/en/944501468253199270/pdf/362970IQ.pdf >

expansion of oil production and expanding urban centers prompted a wave of migration from southern Iraq to Baghdad and Basra in the late 1940s to mid 1950s as agriculture and pastoralism became less viable due to issues of water, and the system of land ownership changed.[134]

First Wave of Rural-Urban Displacement (1947 to 1956)

A big wave of rural-urban migration from the southern governorates to the big cities like Baghdad and Basra took place between 1947 to 1956.[135] There were about 600,000 to 800,000 Iraqis from southern Iraq who moved to Baghdad and 120,000 to 175,000 migrant communities in the south who moved to Basra.[136] A 1957 study that examines the drivers for migration during that period revealed that people moved mainly due to issues related to poor water management; there were massive floods that had swept large areas of southern Iraq causing widespread damage to crops and property in 1954;[137] farmers also faced a lack of water for irrigation purposes and were confronted with inadequate methods of cultivation.[138] As agricultural productivity declined, people of southern Iraq were forced to move their homes and seek other occupations in Baghdad and Basra.[139] Southern Iraqis were to face yet another wave of forced environmentally-induced displacement four decades later following the rise of the Ba'athist party and the presidency of Saddam Hussein. Southern Iraqis were seen as a threat to the state of Iraq during the Ba'athist regime and faced massive forced displacement.

[134] Phillips, Doris. "Rural-to-Urban Migration in Iraq" *Economic Development and Cultural Change* 7, no. 4 (1959): 405-421.
[135] *Ibid.*
[136] *Ibid*.
[137] Baali, Fuad. "Relation of the People to the Land in Southern Iraq." University Press of Florida, 1966.
[138] *Ibid*.
[139] *Ibid*.

Warfare, Water Destruction and Displacement

In the years following the fall of the Iraqi monarchy and the rise of the republic in 1968, Iraq's irrigation and hydroponic system was neglected. In the 1970s, the Ba'athist party rose to power, and Saddam Hussein became the president of Iraq in 1979. The subsequent years in Iraq were characterized by a complete degradation to the country's water system as the Ba'athist government's aggressive military state proliferated, and its political ideology became a militaristic one. Two years after the end of the Iraq-Iran war that lasted eight years from 1980 to 1988 the regime of Hussein waged an unsuccessful war on Kuwait in an attempt to annex it. In response, the US and its coalition forces comprised of 35 nations began Operation Desert Storm, or the first Gulf War, that expelled Iraqi troops from Kuwait.

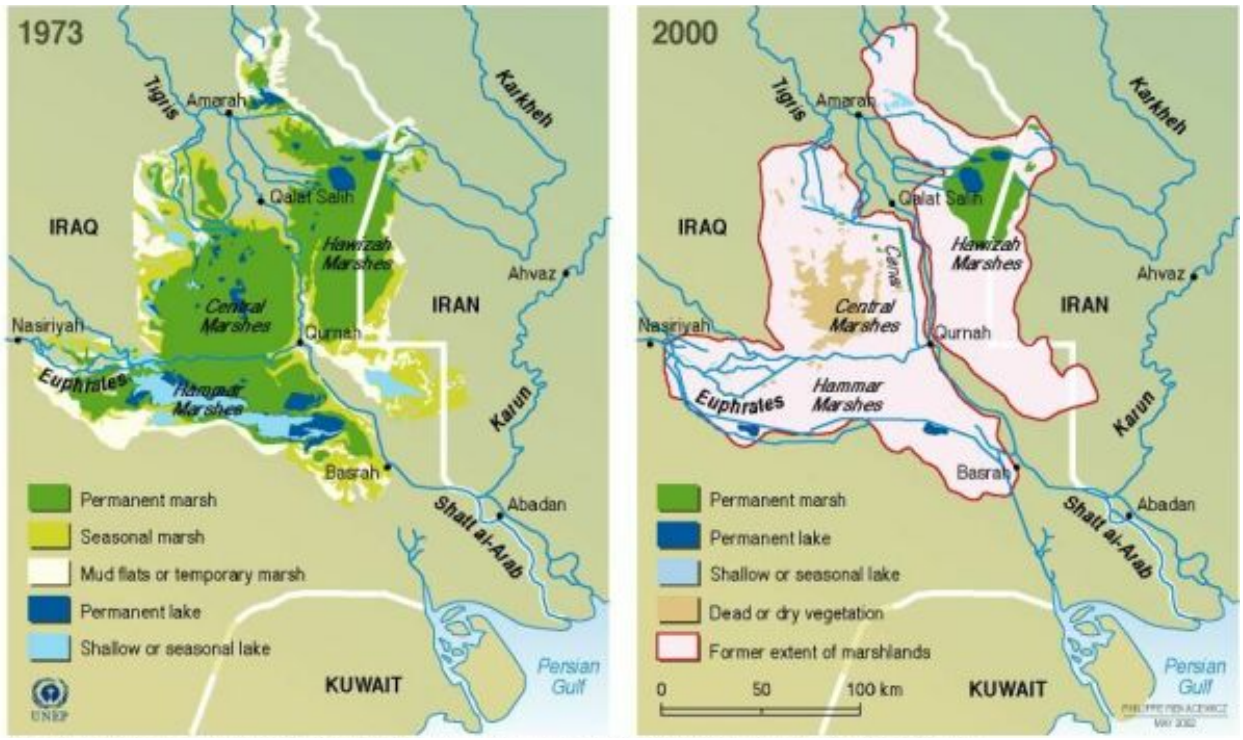
The environmental implications of all these wars were disastrous. During the Iraq-Iran war, Iranian forces bombed a hydroelectric station in Kurdistan.[140] Baghdad's modern water supply and sanitation system was deliberately destroyed during the first Gulf War as the US and its allies bombed eight multi-purpose dams and destroyed four out of the seven major pumping stations as well as roads and infrastructure crucial for farms; 31 municipal water and sewerage facilities were also bombed resulting in sewage pouring into the Tigris River.[141] Iraqis suffered the consequences.[142] Two major events followed the first Gulf War that further impacted Iraq's water system and the Iraqi people: the destruction of the Mesopotamian marshes by the Ba'athist regime in 1990 and the UN sanctions imposed on Iraq in 1991.

[140] Gleick, Peter H. 1993. "Water and Conflict: Fresh Water Resources and International Security." *International Security* 18 (1): 79–112.
[141] Arbuthnor, Flicity. "Allies Deliberately Poisoned Iraq Public Water Supply In Gulf War." Sunday Heralod. 2001.
[142] Falk, Richard. *The Costs of War: International Law, the UN, and the World Order After Iraq*. Routledge, 2008.

Almost immediately after the Gulf War, the US encouraged a Shi'a uprising in southern Iraq with the aim of further destabilizing Hussein's government.[143] The US failed to offer military support to the revolution rendering it ulimately unsuccessful.[144] In the aftermath of the short-lived uprising, Hussein undertook an extensive and profound campaign poisoning and draining 90 per cent of the wetlands of southern Iraq, *al ahwar* or the marshes, to quell opposition to his government and further consolidate his power.[145]

The drainage of the marshes involved diverting the water of the Tigris and the Euphrates by creating a third river that was about 565 km long and two canals south and parallel to it.[146] One of the canals diverted the flow of the Euphrates south below the Hammar Marsh, and the second canal that originates in the lower Euphrates region collected water from the Gharraf river and diverted it under the Euphrates, away from the Central marsh and below the Hammar marsh towards Basra.[147] The newly constructed river, the Glory River, diverted water from the Tigris' southern-flowing tributaries running east and parallel to the Tigris until it reached the Euphrates and its confluence to the Tigris at Quran point.[148] This effectively destroyed an entire ecosystem, as shown in Map 4, including displacing and killing many of the marsh dwellers in south Iraq.[149]

[143] France, Robert, and Edward L. Ochsenschlager. *Wetlands of Mass Destruction: Ancient Presage for Contemporary Ecocide in Southern Iraq*. Libri Publishing, 2007.
[144] Alwash Azzam, Alwash Suzanne, and Cattarossi Andrea. "Iraq's Marshlands - Demise and the Impending Rebirth of an Ecosystem." *World Water and Environmental Resources Congress*. 2004. Access at < https://ascelibrary.org/doi/abs/10.1061/40737%282004%291>
[145] Ibid
[146] Ochsenschlager, Edward. "Iraq's Marsh Arab in the Garden of Eden." *University of Penn Press,* 2004.
[147] Curtis J. Richardson, Peter Reiss, Najah A. Hussain, Azzam J. Alwash, Douglas J. Pool. 2005. "The Restoration Potential of the Mesopotamian Marshes of Iraq." *Science* 307, no. 5713 (2005):1307-1311.
[148] Alwash Azzam, Alwash Suzanne, and Cattarossi Andrea. "Iraq's Marshlands - Demise and the Impending Rebirth of an Ecosystem." *World Water and Environmental Resources Congress*. 2004. Access at < https://ascelibrary.org/doi/abs/10.1061/40737%282004%291>
[149] Alwash Azzam, Alwash Suzanne, and Cattarossi Andrea. "Iraq's Marshlands - Demise and the Impending Rebirth of an Ecosystem." *Critical Transitions in Water and Environmental Resources Management*, (2004)



Map 4 Before and after Maps displaying the Destruction of the Mesopotamian Marshes[150]

Marsh dwellers occupy the low-lying zone in the south of the Tigris and Euphrates River Basin that runs across three governorates—Dhi Qarriya, Missan and Basra—covering a total area of 20,000 sq. km of open water that includes both permanent and seasonal marshes.[151] There are three major marshes: Al Hammar, the Central Marsh and the Hewaizah Marsh, all of which were drained during Saddam Hussein's drainage campaign of the early 1990s. The Marsh dwellers' main sources of livelihood, buffalo herding and fishing, were obliterated with the loss of the ecosystem. As a result, almost all of the Marsh dwellers were forced to leave. The population of the Marshes was reduced from nearly 500,000 people in the 1950s to as few as 20,000 by

[150] *Ibid*.
[151] Bedair, HM, Al Saad H.T. and Salman, N.A. "Iraq's Southern Marshes Something Special to Be Conserved; A Case Study." *Marsh Bulletin* 2, no. 1 (2006) 99-126.

2003.[152] In the aftermath of the 2003 war, Nature Iraq along with the Ministry of Water Resources and the UNDP implemented a plan to divert the Euphrates water to the marshes. Three canals were created to divert the water of the Euphrates to the Central and Hammar marshes effectively restoring 40 to 60 per cent of the marshes.[153] Most of the marsh dwellers have not been able to return to their homeland as both nature and culture have changed in the intervening period making the old lifestyle impossible.[154] In addition to the drainage of the marsh, Iraqis bore the burden of a brutal UN sanctions between 1991-2003 that severely impacted its water system and agricultural productivity.

Economic Sanctions of the 1990s

The UN Security Council passed Resolution 687 in 1991 that imposed economic sanctions on Iraq.[155] The sanctions were a reaction to Iraq's invasion of Kuwait and to disarm Iraq of weapons of mass destruction.[156] The sanctions banned all trade and financial resources to Iraq, except for medicine which was highly regulated.[157] The sanctions had disastrous consequences on Iraq's economy and people.[158] In total, UN Sanctions left 500,000 Iraq children dead and around 5,000 others suffering in the aftermath. Some of the impacts is related to the shortage of clean water due to the deliberate destruction of the water treatment supply system.[159] Evidence reveals that the US Defense Intelligence Agency deliberately intended to destroy Iraq's water system through

[152] "The Iraqi Marshlands: A human and environmental study." AMAR International Charitable Foundation. 2001. Access at < https://reliefweb.int/report/iraq/iraqi-marshlands-human-and-environmental-study>
[153] "Conserving and Restoring the Iconic Marshes of Southern Iraq." Wetlands International. 2016. Access at < https://www.wetlands.org/casestudy/conserving-and-restoring-the-iconic-marshes-of-southern-iraq/>
[154] "The Iraqi Marshlands: A human and environmental study." AMAR International Charitable Foundation. 2001. Access at < https://reliefweb.int/report/iraq/iraqi-marshlands-human-and-environmental-study>
[155] S/RES/687
[156] *Ibid*.
[157] Alnasrawi, Abbas. "Iraq: Economic Sanctions and Consequences, 1990-2000." *Third World Quarterly* 22, no. 2(2010): 205-218.
[158] *Ibid*.
[159] Nagy, Thomas. "The Secret Behind the Sanctions: How the U.S. Intentionally Destroyed Iraq's Water Supply." The Progressive. 2001. Access < http://progressive.org/ 0801issue/nagy0901.html>

the 1990s economic sanctions.[160] The primary document, "Iraq Water Treatment Vulnerabilities", dated 1991, illustrates how sanctions would deprive Iraq of clean water:

> Iraq depends on importing specialized equipment and some chemicals to purify its water supply, most of which is heavily mineralized and frequently brackish to saline," the document states…With no domestic sources of both water treatment replacement parts and some essential chemicals, Iraq will continue attempts to circumvent United Nations Sanctions to import these vital commodities. Failing to secure supplies will result in a shortage of pure drinking water for much of the population. This could lead to increased incidences, if not epidemics, of disease.[161]

The UN sanctions also meant that Iraq could not renew its farming technology. As a result, its agricultural productivity suffered due to the lack of fertilizers, agricultural equipment and necessary pesticide. Further, salinity had spread throughout much of Iraq's southern and central irrigated fields as the government was not able to maintain the irrigation system.[162] Iraq's agriculture stagnated beginning in the early 1990s forcing Iraqi farmers to move into nearby cities for better economic opportunities. [163] Both the Hussein drainage campaign and the UN sanctions were deliberate actions that were taken to inflict harm on Iraq, with varying degrees of impact.

Conclusion

This Chapter provided a historical overview of southern Iraq with an emphasis on the internal, international and transnational actors that have impacted Iraq's water resources and caused displacement. The current state of Iraq's water system and resource scarcity cannot be understood without a review of how different historical events have impacted the movement of people in southern Iraq. The next Chapter sheds light on Iraq's history post-2003 focusing on the

[160] *Ibid*.
[161] *Ibid*.
[162] Tzouvala, Ntina. "Food for the Global Market: The Neoliberal Reconstruction of Agriculture in Occupied Iraq (2003-2004) and the Role of International Law." *Global Jurist; Berlin* 17, no. 1 (2017): 1-27.
[163] "Agricultural Policy Dialogue Series #6: Iraq Input Productivity Gap and Agricultural Competiveness." USAID-IRAQ. 2011. Access at <http://www.inma-iraq.com/sites/default/files/06_iraq_impact_productivity_gap_2011jan00.pdf>

role of international and transnational actors in Iraq's water system and the impact these actors have had on displacement.

Chapter Three:

Post-2003 Iraq: International and Transnational Impacts on Water Resource Management and Displacement in Iraq

"The best time to invest is when there is still blood on the ground"
A Delegate at the 'Rebuilding Iraq 2' conference in Washington D.C.[164]

"Like the prisoners in Guantanamo's love shack, all of Iraq was going to be bought off with Pringles and pop culture- that, at least, was the Bush administration's idea of postwar plan."
Naomi Klein [165]

Introduction

As the previous Chapter highlights, national, international and transnational factors have played a significant role in Iraq's water sector, with various implications on displacement. This Chapter draws attention to transnational factors that have impacted Iraq's water sector post-2003 in the form of post-conflict reconstruction efforts. A series of aggressive neoliberal reforms were undertaken by the Coalition Provisional Authority (CPA) that administered Iraq between 2003 and 2005. These reforms can be observed in Iraq's agriculture, water, and energy sectors, among others; they can be better understood when placed on the spectrum of neoliberal state-building through international law and global economic forces such as the World Bank and the International Monetary Fund (IMF). While literature has been published on Iraq's agriculture and energy sector post 2003, [166] the water sector has been largely left out of the analysis even by critical accounts of the occupation.

[164] Klein, Naomi. *The Shock Doctrine: The Rise of Disaster Capitalism*. 1st ed. Metropolitan Books. New York. 2007.
[165] *Ibid*.
[166] *See for example* Tzouvala, Ntina. "Food for the Global Market: The Neoliberal Reconstruction of Agriculture in Occupied Iraq (2003-2004) and the Role of International Law." *Global Jurist; Berlin* 17, no. 1 (2017): 1-27; Hassan, Ahmed, and Benjamin Isakhan. "The Failures of Neo-Liberal State Building in

This Chapter draws on Chimni's argument and maintains that post-2003 reforms have enabled a greater role for international and transnational actors on Iraq's water resources by transferring ownership and control over Iraq's resources. Chimni argues that international institutions realize the interest of an emerging transnational capitalist class. He stipulates that international organizations facilitate "the further liberalization of international and national markets by heavily promoting free trade and export-processing zones of interest to transnational corporation."[167] International institutions remove local impediments to the process of capital accumulation to the "disadvantage of subaltern classes in third and first worlds." [168] This has become evident in Iraq's post-conflict neoliberal model of reconstruction.[169] A transfer of ownership and control of water resources from the public sector to private entities opened up management of Iraq's water to international and transnational entities, while decreasing the role of local stakeholders and the national government in water resource management. Iraq's post-2003 reconstruction model excluded people and paid little to no attention to people's needs.[170] Privatizing the water sector did not address the needs of people, further contributing to population displacement which was already happening for economic and security reasons.

As Iraq becomes more integrated in the global market, the Federal Government of Iraq must increasingly manage its water policies in such a way as to modernize them and adapt them to the

Iraq: Assessing Australia's Post-Conflict Reconstruction and Development Initiatives." *Australian Journal of Politics & History* 62, no. 1 (2016): 87–99; Mahdi, Kamil. "Neoliberalism, Conflict and an Oil Economy: The Case of Iraq." *Arab Studies Quarterly* 29, no. 1 (2007): 1–20; and Looney, Robert. "The Neoliberal Model's Planned Role in Iraq's Economic Transition." *Middle East Journal* 57, no. 4 (2003): 568–86.

[167] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37. Pg. 14-15.

[168] *Ibid.*

[169] Ibid. pg. 15 on post-conflict reconstruction

[170] Chimni argues that post-conflict state continues to be repressive and its resources continue to be privatize. There is consequently little possibility of implementing a reconstruction agenda that pays heed to peoples' needs and frames politics with their participation in mind. Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.

whims of transnational market forces.[171] This Chapter first describes privatization and the commodification of water. Then, it addresses the US role in creating an environment in Iraq whereby the privatization of water resources has not only been encouraged but bequeathed to Iraq as the only viable post-conflict development option. The Chapter also provides a description of the implications for displacement and concludes with the current state of water management in Iraq.

Privatization and Commodification of Water

Privatization has shifted in recent decades towards a more complex and integrated place in the continuum between wholly public and wholly private relationships.[172] McDonald and Ruiters distinguish water privatization in the 1800s from today by recognizing that contemporary privatization of water does not involve full transfer of state assets. Rather it focuses on the transfer of operational and managerial functions from state entities to private companies creating 'Public-Private Partnerships' (PPP).[173] These partnerships are a form of privatization since there is a transfer of power and control over assets to a private company with various rules and regulations guiding the decision and determining how citizens are able to access information.[174] This latter definition of privatization is accepted by the World Bank,[175] WHO, UNICEF,[176] UNDP,[177] and other leading agencies in related fields.[178] Starr argues that the relationship between private and public sectors can range from small operations to large multinational

[171] Refer to Chapter five for the perceptions of local government about water management
[172] Starr, Paul. "The Meaning of Privatization." *Yale Law & Policy Review* 6, no. 1(1988): 6–41.
[173] *See for example privatization in the UK*: Hanke, Steve H. and Walters, Stephen J. K., "Privatization and Natural Monopoly: The Case of Waterworks." *The Privatization Review* 3, no. 1 (1987); and Lorrain, D. "Public Goods and Private Operators in France." In ed. Barley Stoker *Local Government in Europe: Trend and Development,* Palgrave, London, 1991. 89-109.
[174] McDonald, David and Ruiters, Greg. *The Age of Commodity: Water Privatization in Southern Africa*, Routledge. London. 2004.
[175] "Full Divestiture/Privatization." World Bank. Access at < https://ppp.worldbank.org/public-private-partnership/agreements/full-divestiture-privatization>
[176] "Global Water Supply and Sanitation Assessment." 2000. WHO and UNICEF.
[177] "Water and Sanitation Programme." 1997-1998. UNDP-World Bank
[178] Lorrain, D and Stoker, G. 1997. *The Privatization of Urban Services in Europe.*

companies contracted for any duration; there can be joint responsibilities between the state and a private firm in managing operational functions.[179] Similarly, for the purposes of this thesis, I refer to privatization as a generic expression of a range of private sector involvement in service delivery of water wherein assets and decision making are relinquished from the state to a private entity.

Commercialization and commodification are critical pillars in the discussion of privatization of water in Iraq. Once water is considered a commodity it becomes commercialized and eventually privatized. The commodification of water is any "act, policy or practice that promotes or treats water or water services as an article of commerce to be bought, sold or traded through market transaction."[180] The commercialization of water in Iraq takes the form of corporatization whereby services are outsourced to corporations to provide a particular service at cost-effective prices. Corporatization is also a gateway for direct private sector investment, ownership, or control of water resources, by making public water services more attractive to the private sector.[181]

Water Privatization and Displacement

Privatization is linked with displacement because it makes water inaccessible to poor communities. Privatized water is associated with higher prices due to the profit-making incentive, prices at times too high for poor communities to afford.[182] For example, the privatization and commercialization of water in South Africa resulted in 2 million displaced

[179] Starr, Paul. "The Meaning of Privatization." *Yale Law & Policy Review* 6, no. 1(1988): 6–41.
[180] McDonald, David and Ruiters, Greg. *The Age of Commodity: Water Privatization in Southern Africa*, Routledge. London. 2004. Pg. 20
[181] *Ibid*.
[182] Bakker, Karen. "Archipelagos and networks: urbanization and water privatization in the south." *The Geographical Journal* 169, no. 4 (2003): 328-341.

South African due to failure to pay their water bills.[183] Another implication of lack of access to water can be seen in irrigated agriculture, where privatization can result in increased unemployment in rural areas—particularly among farmers—and force rural-urban migration.[184] Additionally, projects undertaken by the private sector, especially those related to water management, do not always undergo social and environmental assessments.[185] There are many examples of this, among them are the internationally-funded hydroelectric projects in Jimma, Ethiopia that were constructed and operated by a private Italian company. The construction projects led to massive displacement in Jimma.[186] In cases of large water infrastructure projects, building is based on technical calculation related to the generation of energy, and displacement is considered a marginal cost rather than a social issue.[187]

Access to water is particularly problematic in post-conflict settings where countries' water management and infrastructure have often been destroyed and people are more likely to lack access to water resources.[188] Lack of water resources becomes another driver for displacement as it interacts with other economic, political and social factors. Post-2003 Iraq witnessed massive displacement that was a result of security issues, unemployment, and food and water insecurity.

Post-2003 Iraq opened up new opportunities to commodify public goods such as water that had previously not been fully integrated into the global market economy. The expansion of new markets through private sector involvement was promoted through a set of new legislations

[183] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.
[184] Bakker, Karen. "Archipelagos and networks: urbanization and water privatization in the south." *The Geographical Journal* 169, no. 4 (2003): 328-341.
[185] Feeney, Patricia, "Globalization and accountability: the corporate sector in involuntary displacement and resettlement." *Forced Migration Review* 8 (2000): 22-24.
[186] Maines, Denial. "Blackouts and Progress: privatization, infrastructure, and a developments state in Jimma, Ethiopia." *Cultural Anthropology 27*, no. 1 (2012): 3-27.
[187] Ibid. Also see: Joann, McGregor. *Crossing the Zambezi: the Politics of Landscape on a Central Africa Frontier*. Vol. 1. James Currey, 2009. for more information on similar consequences of development-induced displacement.
[188] "Water and post conflict peace building," Environmental Peace Building. 2014. Access at < https://environmentalpeacebuilding.org/assets/Documents/LibraryItem_000_Doc_425.pdf>

international trade agreements, and international institutions that were poised to deepen the commodification and privatization efforts in Iraq. These changes have impacted the availability and the quality of water that, when compounded with droughts, security and economic issues, has led to displacement.

Integrating Iraq into the Global Market Economy

Policies of the Coalition Provisional Authority

The CPA reforms following the 2003 war forced Iraq to enter the global market through aggressive neoliberal reforms to the advantage of the transnational neoliberal capital class and the disadvantage of Iraqi people.[189] Integrating Iraq into the global market[190] required the replacement of national laws and jurisdictions with uniform global standards to remove the barriers to capital accumulation at the global level.[191] At the start of Iraq's occupation in 2003, Paul Bremer was appointed by George W Bush as CPA Administrator—a man with no Arabic or Kurdish skills or knowledge of the Middle East. Bremer was given the power to create and implement the CPA's policies, which assumed legislative and judicial power over Iraq between 2003 and 2005.[192] The CPA's role in promoting "the welfare of the Iraqi people through the effective administration of the territory, including in particular working towards … the creation of conditions in which the Iraq people can freely determine their political future" was confirmed by UN Security Council Resolution 1483.[193] This Resolution, as Tzouvala argues, has been a standard practice in territorial administration since 1990, and engaged the international financial

[189] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.
[190] Globalization represents the global integration of international trade, investment, information technology and cultures Sassen, Saskia. *Globalization and its Discontents: Essays on the New Mobility of People and Money.* The New Press, 1, 1988.
[191] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.
[192] Doran, Christopher. *Making the World Safe for Capitalism.* Pluto Press. New York, 2012.
[193] S/RES/1483 (2003)

institutions, most notably the World Bank and the IMF, in the reconstruction of Iraq.[194] In fact, the World Bank established a Directorate in Baghdad to support its "transition to a market economy", and claimed that the future of the water sector "requires good governance, market-based and private sector led growth, and diversification."[195]

The CPA divided Iraq into four geographic zones and administered the country for 14 months, alongside occupying powers that maintained troops on the ground. During these months, Iraq witnessed an overhaul of its economy; privatization, deregulation and severe cutbacks in the public sector were the cornerstone of these reforms.[196] The CPA introduced flat tax rates to make Iraq investor-friendly, created an independent Central Bank and shrank the public sector.[197] Private investment was entrenched in the Interim Constitution,[198] and retained later in the 2005 Constitution, which remains in force.[199] Foreign investors had rights equal to Iraqis in the domestic markets and, according to CPA Order 39, were allowed to take full ownership of Iraqi assets.[200] Furthermore, borders were open and tariffs were abolished; foreign investors were allowed to take 100 per cent of the profits they made in Iraq out of the country without having to reinvest them domestically.[201] Investors were able to sign a lease and contract for 40 years which were renewable. Iraqis had virtually no role in the reconstruction of their country or the decision-making process over their resources. To maintain strong links with the world economy, many of

[194] Tzouvala, Ntina. "Food for the Global Market: The Neoliberal Reconstruction of Agriculture in Occupied Iraq (2003-2004) and the Role of International Law." *Global Jurist; Berlin* 17, no. 1 (2017): 1-27.
[195] Piper, Karen. *The Price of Thirst*. (University of Minnesota Press, 2014).
[196] Doran, Christopher. *Making the World Safe for Capitalism.* (Pluto Press, New York, 2012) Pg. 142-143.
[197] Article 13 of the New Interim Constitution of the Republic of Iraq in the Weekly Gazette of the Republic of Iraq indicated, "natural resources and principles instruments of productions are the property of the nation. The central authority of the Republic of Iraq shall invest them directly in accordance with the requirement of the general planning for the national economy."
[198] Doran, Christopher. *Making the World Safe for Capitalism.* (Pluto Press, New York, 2012) Pg. 142-143.
[199] Article 25 of the 2005 Iraqi constitution states: "The state shall guarantee the reforming of the Iraq economy according to modern economic bases, in a way that ensures complete investment in its resources, diversifying its sources and encouraging and developing its private sector."
[200] Order 39, CPA regulations. Access at < http://govinfo.library.unt.edu/cpa-iraq/regulations/>
[201] Docena, Herbert and Gershman John. "Iraq's Neoliberal Constitution." Foreign Policy in Focus. 2005. Access at < http://fpif.org/iraqs_neoliberal_constitution/>

these policies were integrated in the 2005 Constitution and continue to determine the shape of Iraq's economy today.[202]

Privatizing Iraq's water

In this broad scheme of privatization, water has also become commercialized and privatized, especially as the privatization of water is significant to international donor agencies and the marketplace. Prior to the 2003 War, Iraq's water services were delivered to the population from the Tigris and Euphrates after purification in water treatment plants by the government. At that time, 96 per cent of the urban population had access to safe drinking water as did 31 per cent of the rural population. Sewage and irrigation facilities were fairly developed in the country.[203]

The US and its allies targeted Iraq's water facilities during the 2003 War, severely damaging electrical and water plants, sewage facilities, canals, dams and water desalinization plants.[204] The 2003 war also destroyed vital pumping stations that powered the irrigation schemes which on agriculture depends, particularly in south and central Iraq.[205] In 2003, the US Congress established the Iraq Relief and Reconstruction Fund with 18 billion US dollars used, among other things, to build over 100 water infrastructure and treatment facilities. These services were contracted to US-based construction giants such as Bechtel, Fluor, and Suez; replacing all eleven state-owned companies that previously provided water services.[206] In fact, only a month after the 2003 War stared, the US signed a 680 million USD contract with Bechtel to rebuild Iraq's water

[202] Docena, Herbert and Gershman John. "Iraq's Neoliberal Constitution." Foreign Policy in Focus. 2005. Access at < http://fpif.org/iraqs_neoliberal_constitution/>
[203] Boyer-Souchet, Irene, Kelly Floch, Paul Lagree, and Lenaig Le Gall. "Water Recourses and War in Iraq," Athens week, *European Water and Sanitation Services vs Sustainable Development,*. 2011. Access at < https://eau3e.hypotheses.org/files/2011/11/Leau-en-Irak.pdf>
[204] *Ibid*.
[205] "Iraq in danger of starvation, Says UN" The Guardian. 2003. Access at < https://www.theguardian.com/world/2003/may/11/iraq2> ; Stone, Daniel. "The Assault on Iraqi Agriculture." Global Policy. 2006. Access at < https://www.globalpolicy.org/component/content/article/167/35621.html>
[206] Piper, Karen. *The Price of Thirst*. University of Minnesota Press, 2014.

infrastructure, and rehabilitate the water treatment plants and irrigation structures within six months[207]—Bechtel eventually completed less than half of the construction jobs it was obligated to perform.[208] As Bechtel failed, other corporations such as Fluor were contracted later.[209] By the time Bechtel completely withdrew in 2006, the average Iraqi household received less than 2 hours of electricity, 60 per cent of Iraqis did not have safe drinking water, and only 19 per cent had sewage service.[210] Despite the contracts and the plans, the UN reported in 2013 an "alarming increase in water pollution" with more than a million cases of waterborne illness countrywide. Iraq's water infrastructure and irrigation system was largely in disrepair.[211] Not only did these multinational corporations fail to achieve their contractually obligated goals, they severely impacted the quality of the two rivers, the Tigris and the Euphrates; at least two thirds of the sewage produced by Baghdad's population of 6 million was dumped untreated into the Tigris and the Euphrates.[212] The lack of access to water and failure of the water and irrigation infrastructure contributed to population displacement, which was already happening for economic and security reasons as well as slow-onset environmental events.

Iraqi Displacement

Failure of water services was compounded by a severe drought in 2007 that had profound implications on Iraqis, particularly families in the south. A significant number of families in southern Iraq that were suffering from lack of access to water were forced to rely on sources other than the municipal water grid for their water needs; these included privately owned and

[207] "USAID Awards Bechtel National Iraq Infrastructure II Contract," Bechtel. 2004. Access at < https://www.bechtel.com/newsroom/releases/2004/01/usaid-awardsiraq-infrastructure-2-contract/>
[208] Piper, Karen. *The Price of Thirst*. University of Minnesota Press, 2014.
[209] "Iraq Public Works Water Infastructure." Fluor. Access at <http://www.fluor.com/projects/government-iraq-water-infrastructure-epc>
[210] Doran, Christopher. *Making the World Safe for Capitalism.* Pluto Press, New York, 2012. Pg. 142-143.
[211] "Iraq: No Let-Up in the Humanitarian Crisis." ICRC. 2008. Access at < https://www.icrc.org/eng/resources/documents/report/iraq-report-170308.htm>
[212] Doran, Christopher. *Making the World Safe for Capitalism.* Pluto Press, New York, 2012. Pg. 142-143.

operated water tanks brought in by trucks for people's daily water needs.[213] Those who could not cope with the water scarcity were forced to move. In 2007, the IOM reported that a decline in safe drinking water and sustainable water supplies coupled with the 2007 severe drought in forced 20,000 rural inhabitants to leave their agricultural communities in search of water.[214] This driver of displacement in Iraq was happening in a setting where massive numbers of people were already leaving their homes, internally and regionally, as a result of the 2003 invasion and subsequent sectarian conflict. By 2006, 1.5 million Iraqis had been internally displaced and between 2005 and 2008, as many as 2.5 million people were displaced internally and outside of Iraq.[215] The drivers for displacement were compounded by issues of the damaged infrastructure, loss of economic opportunities, and pressure of dwindling natural resources. Iraqi forced displacement was not only a product of insecurity in the country, but it was also a result of not being able to access basic services, particularly access to water.[216]

In addition, failure in repairing irrigation networks, water storage facilities and drainage networks exacerbated an already struggling agriculture industry in Iraq.[217] The Department of Agriculture in Diyala, southern Iraq, announced in 2012 that damming projects, sidelined agricultural plans, in addition to droughts, had damaged 200,000 acres of agricultural land causing food insecurity and leading to high levels of rural-urban migration.[218] The current state of water management in Iraq is not the same in the 2000s—there isn't as much private sector involvement—but there is a movement towards enabling further privatization.

[213] IOM also reported that even those who were able to afford buying water had to walk long distance to get to the nearest water source. "Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >
[214] "Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >
[215] Sassoon, Joseph. *The Iraq Refugees: The New Crisis in the Middle East.* (I.B. TAURIS, London and New York, 2008).
[216] "Delivering is Never remote: NGOs' vital role" *Forced Migration Review* 2008
[217] "Droughts in Iraq: Natural Hazards." NASA. 2009. Access at <https://earthobservatory.nasa.gov/NaturalHazards/view.php?id=38914> ;"Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >
[218] "Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >

Water Management Structure in Iraq

Iraq's water supply system is managed by the Ministry of Water Resources (MoWR) for the bulk water supply and the Ministry of Construction, Housing, Municipalities and Public Works (MoCHMPW). The MoWR replaced the Ministry of Irrigation in 2003 and is responsible for overall water management in Iraq. The MoWR manages surface and groundwater.[219] The responsibilities of the MoWR include water planning, water allocation, construction, operation and maintenance of facilities for bulk water supply, as well as flood predication and mitigation.[220] The MoWR also operates dams, reservoirs, hydropower stations, irrigation and drainage pumping stations, barrages and regulators.[221] The MoWR is divided into directorates, offices, and commissions. It also contracted companies to regulate functions and operations. The MoWR issues an annual directive for water that allocates water to each governorate based on forecasted future water needs and available water resources.[222] MoCHMPW oversees the planning and development of municipal water and sanitation projects.[223]

On the local level, each governorate has a Directorate of Water Resources that operates under the MoWR who is responsible for implementing the annual water plan published by the MoWR. The Directorate operates irrigation and drainage projects, and dams and regulators within the governorate borders, distributes water quotas in accordance with the governorate's agricultural, drinking and industrial water needs.[224] In doing so, the Directorate of Water Resource works

[219] Ministry of Water Resources, Iraq. Access at <http://www.mowr.gov.iq/en>
[220] "Iraq: Country Water Resource Assistance Strategy: Addressing Major Threats to People's Livelihoods.". The World Bank. 2006. Access at <http://documents.worldbank.org/curated/en/944501468253199270/pdf/362970IQ.pdf>
[221] *Ibid.*
[222] "Interview with the Deputy Director of the Ministry of Water Resources." January. 1 2017, Baghdad
[223] "Iraq: Country Water Resource Assistance Strategy: Addressing Major Threats to People's Livelihoods.". The World Bank. 2006. Access at <http://documents.worldbank.org/curated/en/944501468253199270/pdf/362970IQ.pdf>
[224] "Interviews with Directors of Directorates of Water Resources in Dhi Qarriya, Missan , and Al Qadyysiah ," December 2017. Southern Iraq.

with the Directorate of Agriculture to determine irrigation needs. The Directorate of Environment is primarily responsible for conducting research on air and water and pollution, and weather conditions. It shares its finding with the Directorate of Agriculture and the Directorate of Water Resources.[225] There are currently significant problems between the governorates' Directorates of Water Resources in respect to water quantity, timing of its release and quality, as well as coordination issues with Directorate of Agriculture and Directorate of the Environment.[226]

A year after the CPA left Iraq in 2005, Iraq's water was centralized and publically owned, however, there has been a move in recent years towards privatizing its water.[227] There is a general lack of information on the current state of Iraq's water management system. Nonetheless, according to the World Bank, water tariffs in Iraq are very low while operational costs are high. Domestic water in Iraq is heavily subsidized, with tariff below one US cent/m3. The average annual revenue per connection is around 9,300 Iraqi Dinar ($6 USD).[228] In terms of irrigation, The MoWR distributes subsidized equipment such as tractors and water saving equipment to Iraqis.[229] Currently, Iraq is moving towards privatization and that is seen in Iraq's drinking water. Local private companies such as UB Holding's *Life*, *Lolav* and *Lava* that operate out of Erbil, Kurdistan Region of Iraq and international companies such as Nestle provide drinking water in Iraq. While there is currently no private sector financing of PPPs in the water sector, Iraq has signed loans with international organizations that are conditioned on building Iraq's

[225] "Interviews with the Directors of the Directorate of Water Resources" December & January. Southern Iraq.
[226] Ibid; read more on coordination issues on a ministerial level in "Iraq: Country Water Resource Assistance Strategy: Addressing Major Threats to People's Livelihoods.". The World Bank. 2006. Access at <http://documents.worldbank.org/curated/en/944501468253199270/pdf/362970IQ.pdf >
[227] "Iraq: Country Water Resource Assistance Strategy: Addressing Major Threats to People's Livelihoods.". The World Bank. 2006. Access at <http://documents.worldbank.org/curated/en/944501468253199270/pdf/362970IQ.pdf >
[228] *Ibid*.
[229] *Ibid*.

PPPs.[230] The World Bank recently signed a $210 million loan with Iraq in 2018 to develop its water and sewage service, in addition to a water supply reconstruction project that was signed late 2017.[231] The objective for all projects is to create a hospitable environment for private sector engagement through PPPs.[232]

Conclusion

This Chapter provided an overview of how water in Iraq not only was specifically targeted by the US and its allies for military purposes up until the 2003 year, but also its revitalization was relinquished to private corporations that assumed control over Iraq's water resource management between 2003-2006. The destruction and failure to repair water resource infrastructure contribute to displacement, which was already occurring due to security and other economic reasons. Transnational factors had and will continue to have influence on Iraq's water resources.

[230] "Project Appraisal Document on a Proposed Loan in the Amount of US$210 Million to the Republic of Iraq." World Bank, 2018. Access at < http://documents.worldbank.org/curated/en/869811517626846051/pdf/BAGHDAD-NEWPAD-01112018.pdf>

[231] "Environmental and Social Impact Assessment (ESIA)/Environmental and Social Management Plan (ESMP)." The World Bank . 2017. Access at <http://documents.worldbank.org/curated/en/803641504228408336/pdf/SFG3575-V2-EA-P162094-Box405298B-PUBLIC-Disclosed-8-31-2017.pdf>

[232] "World Bank's Commitment to Iraq Reaches US. 4.7 Billon." World Bank. 2018. Access at <http://www.worldbank.org/en/news/press-release/2018/02/13/world-banks-commitment-to-iraq-reaches-us47-billion> ; "Project Appraisal Document on a Proposed Loan in the Amount of US$210 Million to the Republic of Iraq." World Bank, 2018. Access at < http://documents.worldbank.org/curated/en/869811517626846051/pdf/BAGHDAD-NEWPAD-01112018.pdf>

Chapter Four:

Perceptions of Water Scarcity: Reporting from the Region

"We, like fish, cannot survive without water."
Iraqi Buffalo Herder and Fisherman[233]

Introduction

Chapter Four asks how displaced communities and policymakers perceive the causes of water scarcity in three governorates of southern Iraq. While environmental and development research in southern Iraq regarding the situation of the marshlands is already well-documented, the personal experiences of individuals are often not included. Perspectives from individuals displaced by water scarcity such as the Iraqi buffalo herder and fisherman quoted (see Figure 1) are not frequently considered in policy documents and scholarly works on southern Iraq. This Chapter analyzes water scarcity issues and displacement in southern Iraq from the perspective of those who live in the region. It examines how internal, international and transnational factors that contribute to water scarcity and displacement are understood by policymakers, displaced communities and civil society groups in southern Iraq.

[233] "Interview with an Iraqi fisherman." December 2017. Hewaizah Marsh, Missan , Iraq,

Figure 1 A buffalo herder and fisherman in Hewaizah Marsh, Missan Governorate. Tiba Fatli, Missan, Iraq, December 7, 2018.

Fieldwork data for this Chapter is based on semi-structured interviews with individuals that took place in three governorates in southern Iraq: Al Qadyysiah , D and Missan (fieldwork information is the annex). These governorates are situated at the ends of the two main rivers, the Euphrates and the Tigris, and are the most severely impacted by water scarcity.[234] Interviews were conducted with members of civil society, displaced populations and communities threatened by displacement, and directors in the Directorates of Environment, Agriculture, and Water Resources. Interviews were collected with communities residing, at the time of the interview, near water sources (see Maps 5 and 6). I argue that to better understand the complexities of environmental change and displacement in southern Iraq, scholars and policymakers need to take into account the perceptions of those most impacted by water scarcity.

[234] "Water in Iraq Factsheet." Relief Web. 2013. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water-Factsheet.pdf>

This Chapter begins with a description of the governorates and the communities in which the fieldwork took place. Discussions on the data and documentation of the experiences gathered from interviews follows. Analysis of the data and conclusions are provided in Chapter Five.

Fieldwork Limitations

There are three main limitations to the fieldwork. One of the major limitations is the gender balance in interviews, which were mainly conducted with older men. My points of contact in the remote regions of Southern Iraq are all Iraqi males, who are all also active NGO workers in their respective governorates. The majority of the participants in the interviews were men unless female family members had accompanied them. While I did not ask females about their refusal to be interviewed, I speculate that the reasons for their decline to be interviewed is centered around cultural concerns and the fact that my community outreach coordinator were male. The few female participants I encountered were reluctant to speak of their perceptions about water scarcity and experiences of displacement, and often refused to participate. This is despite the fact that women take equal responsibility in economic activities, such as herding, milking, and fishing in addition to household chores like dish washing and cleaning. Their opinions and agency are not widely recognized by men, and even women counterparts. Thus, my fieldwork data over-represents men's perceptions.

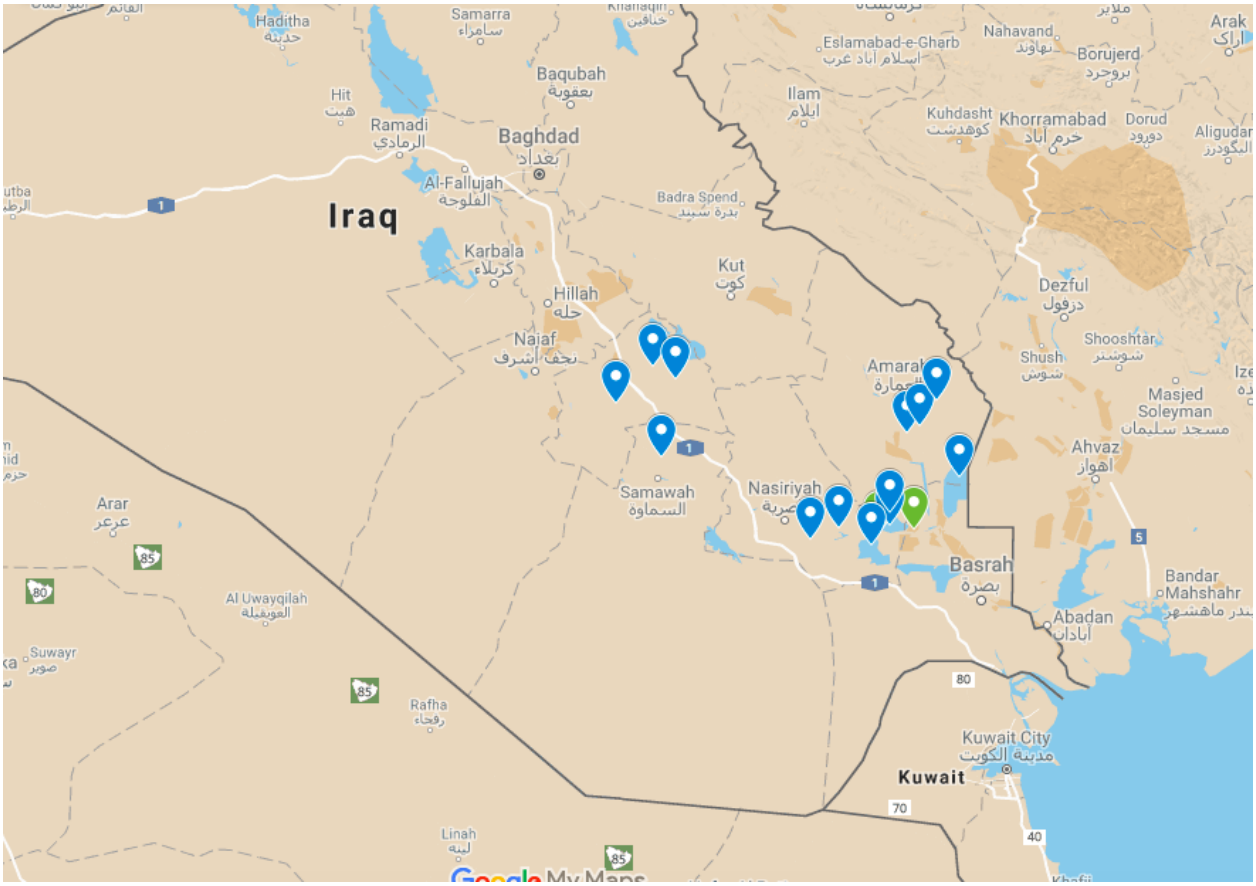
The second limitation concerns potential interviewees who were invited by the facilitator to participate in the research. One or more factors may have skewed their responses: for example, their fear of retribution from tribal members or leaders, the desire for assistance, or being influenced by the facilitators' opinion. This was especially true in the Al Qadyysiah governorate due to tribal and land conflicts, most recently exacerbated by water scarcity. It was also

anticipated that participants might exaggerate their vulnerabilities and diminish their agency and opinions.

The last limitation is about logistical and security concerns. I was unable to observe or conduct interviews in other communities that were also facing severe depletion in water resources such as those bordering Iran due to security issues and limited fieldwork time. Finally, due to the short duration of the fieldwork there was no time to revisit fieldwork sites and continue to build trust with respondents over time and gather additional data in confidence. While the validity of the data is thus skewed, my data nevertheless covers important areas that face severe water depletion, and information was confirmed with multiple sources to validate fieldwork data such as drought years, and other environmental and political events specific to southern Iraq.

Map 8 Fieldwork sites: Each of the pins represent the general locations for the Directorate of Agriculture, Directorate of Water Resources, and Directorate of Environment for each governorate.[235]

[235] "Physical map of Iraq." UNEP.



Map 9 Fieldwork sites: each of the pins represents a location of fieldwork site with community members

Governorate Profiles

The three governorates visited were Dhi Qar, Al Qadyysiah , and Missan .

Dhi Qar Governorate

The governorate of Dhi Qar is located in the southeastern part of Iraq and shares internal borders with the governorate of Basra, Missan , Al Qadyysiah and Muthana. The governorate's main water source is the Euphrates, which crosses the governorate and feeds into the Hammar marsh and Central marshes that cover one fifth of Dhi Qar's total area.[236] The governorate has a dry desert climate that is typical of the region, with hot and dry summers and mild winters. Rainfall

[236] "Thi-Qar Governorate Profile." NGO Coordination Committee for Iraq. 2015. Access at < https://ncciraqbids.com/images/infobygov/NCCI_ThiQar_Governorate_Profile.pdf>

is limited to the months of November to April and averages 100 mm per year.[237] Dhi Qar is divided into five districts: Al Chibayish, Nassirya, Al Rifa'I, Al Shatra and Suq Al Shuyukh, with 1,742,852 inhabitants, the majority of whom are Shi'a Arabs, with low numbers of Sunni Arabs, Assyrian and Chaleadan Christians, and Mandeans.[238]

Dhi Qarriya's marshes are home to the Marsh dwellers, many of whom have been displaced since 1991,[239] are currently in the process of being displaced, or under threat of displacement due to water scarcity and drought. Most of those who were internally displaced in the 1990s went upstream the Tigris River either to the Hewaizah marsh in the Missan governorate as it was not as impacted by Saddam Hussein's drainage campaign like the other two marshlands, or to Tikrit northwest of Baghdad. Between 2003 and 2005 most of those marsh dwellers displaced from Dhi Qar during the 1990s returned to Central and Hammar marshes when 50 per cent of the marshes were re-flooded. [240] In spite of the re-flooding, in the last decade and a half, the restored area has shrunk drastically. There were four particularly bad drought years that have resulted in the shrinking of the area: 2003, 2005, 2015, and 2017, the latter during the time of this fieldwork.[241] As a result of the dwindling wetlands, marsh dwellers have been moving back and forth between locations in Missan and northwest Baghdad. The areas that were especially affected by the marshes' droughts and forced displacement are Chibayish, Fhood, Hammar, Islah, Souq Al-Shuyoukh, Tar, Akika, Garmat Bani Saiid, and Said Dikhil.

[237] *Ibid*
[238] *Ibid*
[239] Refer to Chapter two
[240] This was cited during interviews with Marsh dwellers and verified by Nature Iraq and government officials.
[241] "Iraq Drought Hits Marshes in 'Garden of Eden'" Associated Press. 2009. Access at <http://www.nbcnews.com/id/30227029/ns/weather/t/iraq-drought-hits-marshes-garden-eden/>

Missan Governorate

The second location for the fieldwork was Missan , alternatively named Missan. The governorate is located in southern Iraq on the border with Iran. Its geographical landscape is dominated by the Hewaizah marsh fed by the Tigris River. The marsh is transboundary, shared with Iran, and receives 40 to 50 per cent of its water from the Karkhah River on the Iranian side of the marsh and the rest from the Al Musharah and Al Kahla rivers on the Iraqi side. On the Iranian side, the marsh is known as the Haur Al Azim. Missan 's climate and demographic is similar to that of Dhi Qar's, but it has a smaller population of 922,072 million inhabitants. Missan is comprised of six districts: Ali Al Gharbi, Al Mejar Al Kabir, Al Maimouna, Al Kahla Ammarah and AL At Saleh.[242]

According to the accounts of people from Missan during the fieldwork, Missan's infrastructure was severely impacted by the wars and drainage campaign of the 1980s and the 1990s.[243] This inhibited and continues to constrain the national government's ability to distribute water through its canals. The Hewaizah marsh did not experience the same levels of drainage and has remained ecologically more intact than the Hammar and Central marshes because of the input of water from the Karkhah river on the Iranian side.[244] Thus, while some marsh dwellers migrated to Iran for refuge, others stayed and were joined by marsh dwellers from the other two marshes that were completely dry. Although Hewaizah remained more ecologically intact from the drainage campaigns than in other areas, current residents are facing severe water scarcity. Today, marsh

[242] "Governorate Profile Missan." NGO Coordination Committee in Iraq. 2015. Access at < https://ncciraqbids.com/images/infobygov/NCCI_Missan_Governorate_Profile.pdf>
[243] *Ibid.*
[244] "Report on a Ramsar Team Visit to the Hewaizah Marsh Ramsar Site, Iraq." *Ramsar.* 2014. Access at < https://www.ramsar.org/document/report-on-a-ramsar-team-visit-to-the-hawizeh-marsh-ramsar-site>

dwellers from the other two marshes and traditional residents of Hewaizah are forced to survive on shrinking water (see Figures 2 and 3).[245] As a result of this water scarcity throughout Missan, people move to urban areas internally, as well as to Iran.

Figure 2 and 3 Hewaizah water level: a Hewaizah resident uses a stick to demonstrate the low water level in the marsh the civil society members observe the shallow marsh. Tiba Fatli, Missan, Iraq, December 29, 2018.

Al Qadyysiah Governorate

The third fieldwork site was Al Qadyysiah governorate situated in southcentral Iraq. It is considered one of the most fertile areas of the country and enjoys a high level of agricultural activities. The main crops cultivated historically in the governorate are rice, wheat, and barley. As a result of water shortages, however, many rice and barley fields are being replaced with vegetables such as tomatoes and lettuce that consume less water. The Euphrates River and one of its major tributaries, the Shamiya River, both run through the governorate. Its climate and demographics resemble that of Dhi Qar and Missan, with 1,076,658 inhabitants.[246] The Al Qadyysiah governorate is composed of four districts: Al Qadyysiah , Afaq, Al Shamiya and Al Hamza.

[245] "Interview with Marsh Dwellers." December 2017. Missan , Iraq.
[246] "Qadyysiah Governorate Profile." NGO Coordination Committee for Iraq. 2015. Access at < https://ncciraqbids.com/images/infobygov/NCCI_Qadissiya_Governorate_Profile.pdf>

Environmentally-Induced Displacement in Southern Iraq

As crops fail and buffalo die, both herders and farmers leave the marshes and rural areas for urban locations. Traditionally, some marsh dwellers with more nomadic lifestyles relied on buffalo herding and fishing to meet their needs while sedentary farmers grew wheat and barley. Internal migration has long characterized the lives of marsh dwellers. While buffalo herders on the marshes have always moved within the marshes, the communities viewed the movement as seasonal and not "forced." In the winters, herders move downstream to avoid cold and deep levels of water; in the dry summers, dwellers return upstream.[247] Beginning in 1991, however, communities began to describe their movements as displacement, and today this word remains in their vocabulary because they are being forced to abandon southern Iraq, the marshes, and, for some, even the country; not out of choice but out of necessity.

Generally, there are two kinds of environmentally-induced displacement that is occurring in southern Iraq linked to water. One is buffalo herders who stay close to the marshes and move upstream along the two rivers; and the other is displaced farmers whose land is no longer arable, or has been sold to private or public contractors. The lands are then mainly used for real-state and private investment.[248] As a result of resource scarcity, people in southern Iraq abandon their land or sell it to private or public investors and move to urban areas such as Baghdad.

While these categorizations do broadly apply, they do not describe all experiences. In some cases, decreasing water availability and increasing droughts cause the traditional distinctions

[247] S.M. Salim. *Marsh Dwellers of the Euphrates Delta,* BERG, 1962.
[248] "Interview with Civil Society Advocates and farmers." December & January 2018. Southern Iraq.

between farmers and herders to be blurred as people in southern Iraq diversify their means of livelihood production. Farmers start to herd, and herders start to farm. Yet for many families, this only prolongs an eventual displacement. This is the case for the family pictured in Figure 4 Their animals died and their farms failed. In the pictures below they are packing and moving to an urban setting nearby.

Figure 4 A Family in Missan migrating to a nearby village. Photo taken during the fieldwork. Tiba Fatli, Missan, Iraq, December 10, 2018.

Perceptions of Water Scarcity

"We just want a fair distribution of water. We need fairness"

Iraqi Farmer[249]

"We view water scarcity in relation to our lives and environments. Water is part of our lives and cannot be removed."

Iraqi Marsh Dweller[250]

This section highlights the perceptions of policymakers, civil society members, and those impacted by displacement about the reasons why southern Iraq is facing water scarcity. Discussions focused on international, national, and transnational factors. While community members and government officials generally agree on the definition of water scarcity and the drastic decline in the levels of water resources of southern Iraq in recent years, perceptions of the causes and proposed solutions differ. As a result of differences in problem definition, officials and community members propose different solutions. Government officials frequently highlight increasingly efficient allocation systems as possible solutions to the water crisis while community members do not see that solution as being sufficient to address changes in the climate.

International Factors

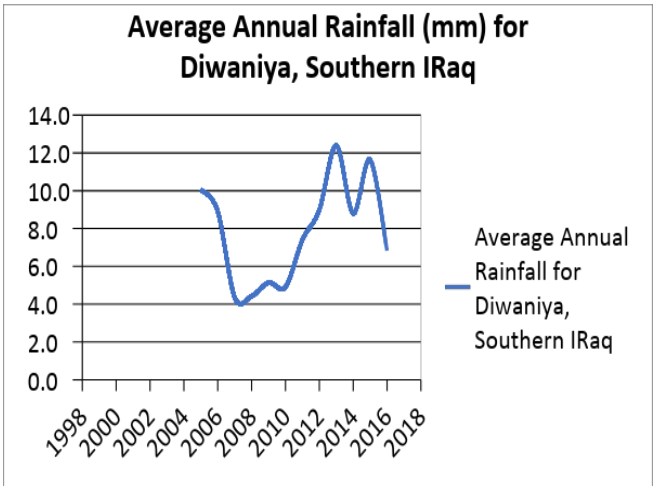
Climate Change

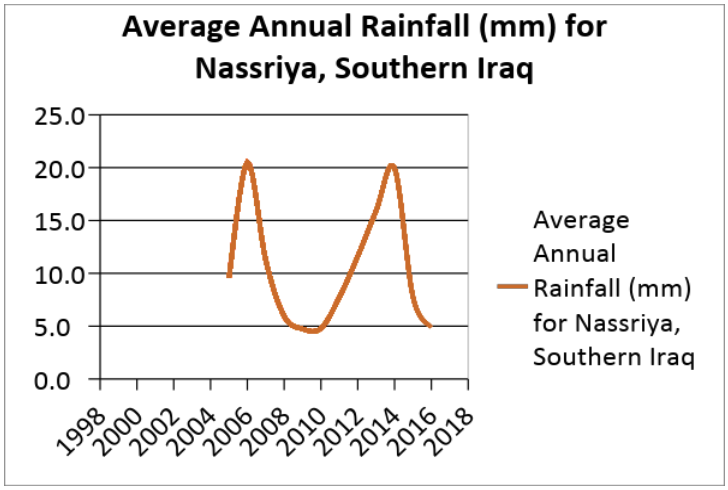
International factors were heavily stressed by different groups of marsh dwellers and farmers. Their main grievances and perception of the catastrophic state of water in their homeland is closely linked to the lack of rainfall and necessary evaporation, and extreme heat waves. There

[249] "Interview with an Iraqi farmer." December 2017. Al Qadyysiah , Iraq.
[250] "Interview with an Iraq Marsh dwellers who fishes and herd water buffalo." December 2017. Dhi Qar, Iraq

were four years of severe droughts between 2005 and 2017 that were consistently cited throughout interviews: 2005, 2008, 2015 and 2017. These drought dates were identified by marsh dwellers during fieldwork and corroborated by data gathered from the Ministry of Transportation (see Figure 5, 6, 7 and 8).[251] For interviewees, these environmental changes constituted a direct and obvious cause that was often characterized as being "unprecedented" and "unsolvable." They had not witnessed such severe droughts with such frequency in their lifetimes. Buffalo herders and farmers who have resided within southern Iraq their entire lives understand the changing climatic conditions as a general trend occurring not just within the state boundaries of Iraq but beyond as well. In short, people who have never left southern Iraq link changes in their once familiar environment to global climate change. For officials, climate change was rarely discussed; rather, other international and internal factors were perceived as the causes for the scarcity such as governance, corruption, the politics of Turkey and Iran, and irrigation methods.

[251] Full data is provided in the Appendix I.





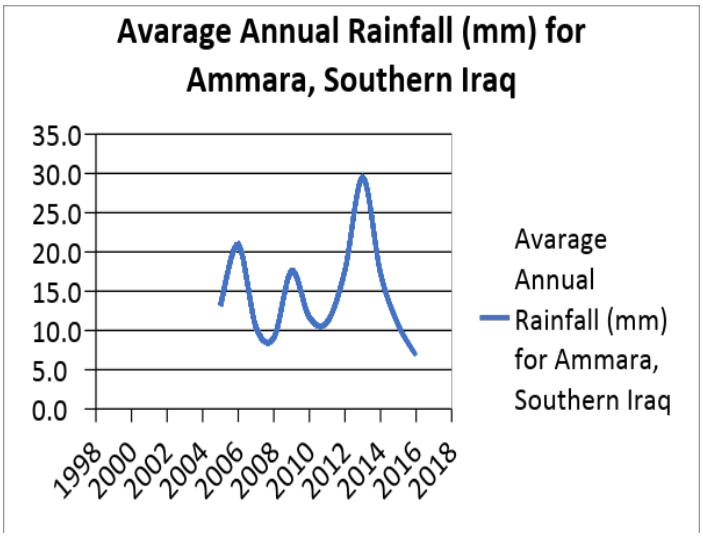


Figure 5, 6, and 7 Average Annual Rainfall in Fieldwork Governorates as recorded by the Meteorology and Seismic Monitoring Center Iraq's Ministry of Transportation

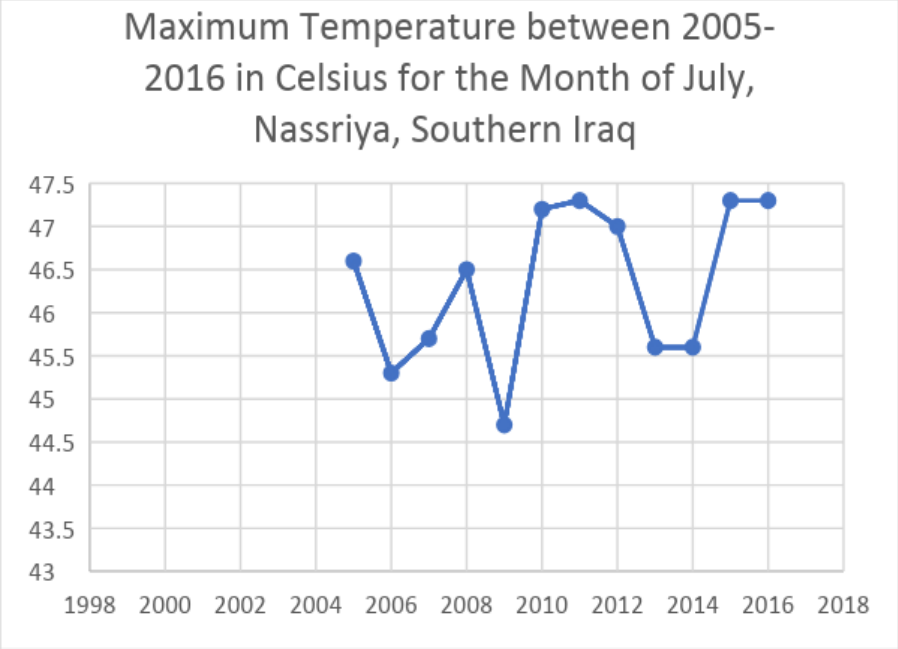


Figure 8 Maximum Temperature for the month of July (Celsius) in Dhi Qar, Southern Iraq as recorded by the Meteorology and Seismic Monitoring Center Iraq's Ministry of Transportation

Community members appear to anticipate that this severe change in weather patterns is not only unprecedented but also irreversible. They perceive severe heatwaves and the uncertainty in rainfall as the major threats to their livelihoods. Marsh dwellers who were displaced in the 1990s indicated that their current forced movements are more threatening to them than the previous one because the frequency of the reduction in water levels and the severity is related to weather conditions that might not change as opposed to internal politics that can be changed. Hussien's diversion of water sources in the 1990s can be un-done, as was the case in 2004 when the marshes were restored. Yet heatwaves and rainfall cannot be fixed by the national government. Similarly, farmers who are being threatened with displacement or who have already been displaced indicate that their relationship with their land has changed due to what they perceived to be "irreversible climate change." One displaced farmer informed me of his realization: "When I moved to Baghdad in the 1990s, I knew I would be back, so I did not sell my land. Last year, I

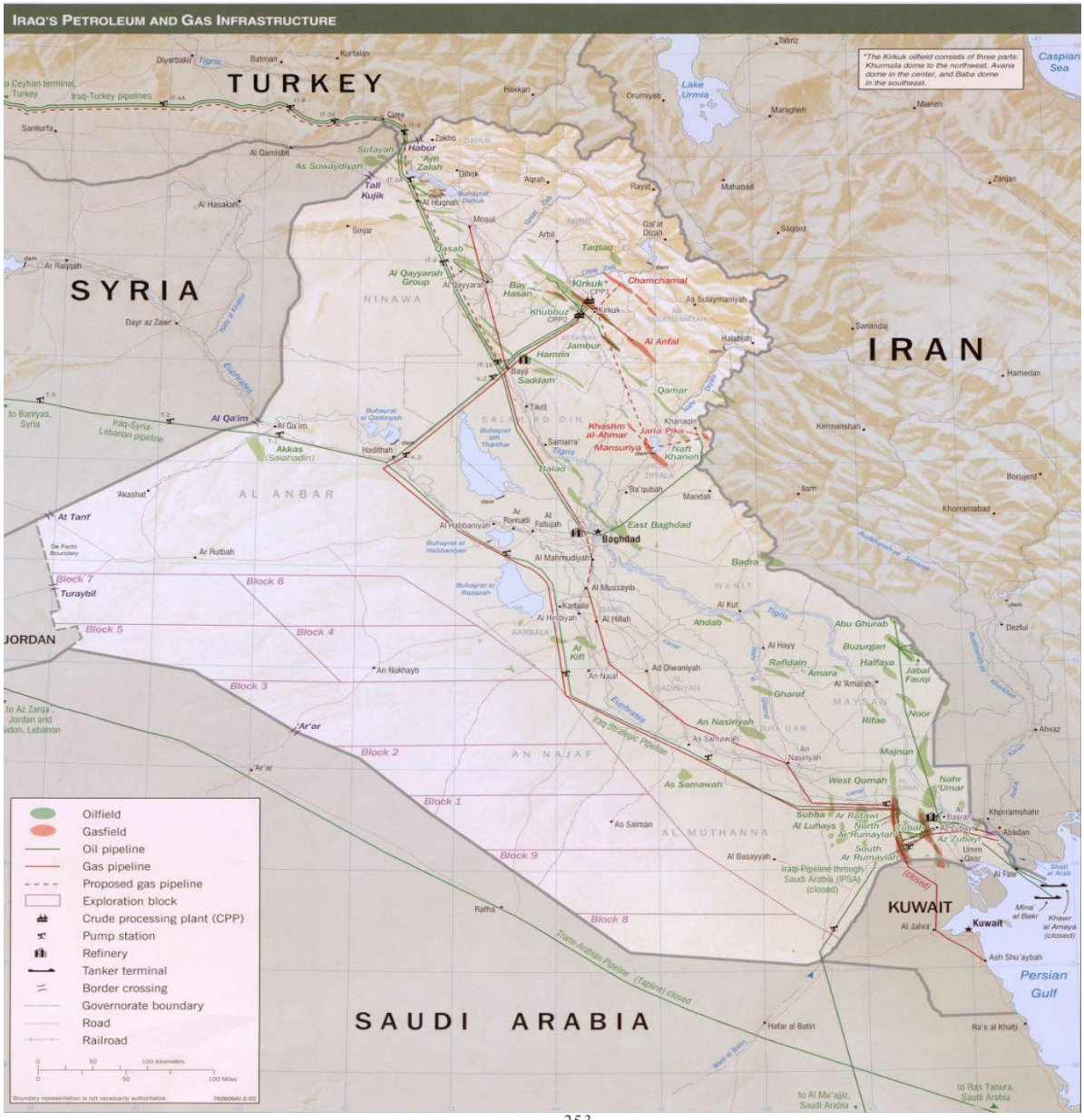
had to sell 20 dunums[252] of my land because I have not been able to cultivate it since 2008." Most farmers in Al Qadyysiah and Missan report similar stories.

Community members link climate change with supernatural forces or/and pollution from industries, especially oil factories in the south:

> "It's in Allah's hand."
> "We don't know why. It is up to Allah."
> "We see factories drill and water turns dirty afterwards. There has to be a connection."

The few women I was able to speak with during the fieldwork in Missan also expressed health concerns about using the Tigris water for bathing and doing household chores. They directly link it to fracking (see Map 7 for petroleum and gas infrastructure locations).

[252] Dunum is a common unit of measurement used to measure agricultural land. 1 Dunum = .1 hectors



Map 10 Iraq Petroleum and Gas Infrastructure [253]

Dam Building

Another international factor cited among community members across the governorates is dam building outside of Iraq's borders. This factor is perceived to be related to Turkey's and Iran's

[253] "Iraq Country Profile." Library of Congress. 2003. Access at < https://www.loc.gov/resource/g7610.ct001095/>

control of the upstream water flow of water resources into Iraq. While officials downplayed climate change, they frequently discussed international factors in light of aggressive Turkish and Iranian policies. Iraqi officials believe that Turkey is managing water resources in order to pressure Iraq into expanding its investments throughout the country for example, by increasing Turkish investment in oil refineries and infrastructure projects inside Iraq. A common narrative that circulates among officials regarding Turkey's Illsu dam project is that its main aim is to submerge areas to oppress dissent in Turkey and pressure Iraq at the same time. This is reflected in the perception of the "oil for water" scheme as a justification for restricting water flows to Iraq. The Iraqi officials interviewed believe that it is the absence of international agreements between Turkey, Iraq, Iran and Syria that water resources are being unequally distributed. In fact, during two conferences on water scarcity and its solutions on December 17th of 2017 and January 6th of 2018 that I attended, Iraqi politicians pushed for the signing of an international water agreement between Iran, Iraq and Turkey.[254]

While some displaced communities reflect the concerns of officials, they perceive the issue as being interrelated with regional climate change. Common comments among individuals who saw dam building as a political concern ranged from "well, we heard that Turkey shuts off water;" "Turkey isn't giving us our share of water;" to "we hear that water resources were shut off from the upstream of the Euphrates." People's perception of this factor rests on their belief that Turkey assumes full control over Iraq's water resources. This issue is compounded by the belief that Iraq has failed to negotiate a water treaty with Turkey and make the necessary political arrangements for equal distribution of water. The "Turkish factor" was often reiterated within a political

[254] Talks between Iraq and Iran on Water Sharing, International talks overseen by the Ramsar Delegation, Ministry of Water Resources, and Civil Society, December 17-December 22, 2017 in Basra, Dhi Qar and Missan governorates of Iraq; "Water Scarcity and Solutions." Conference notes. January 6, 2018. Kerbala, South Iraq,

context that involved exchanges of oil and water between Iraq and Turkey. A statement that was often cited by a majority of participants is, "Turkey wants a barrel of Iraq's oil for a barrel of water." While this is what people hear on the television and news outlets, the perceptions of the political relationships between Turkey and Iraq was one of unequal distribution of transboundary water resources. In addition to citing Turkey as a factor for water shortages, interviewees in Missan raised particular issues with Iran's policies. Iran's dam project on the Karkhah river has severely impacted the river's water level. Iran's and Turkey's policies were viewed as unjust and unfair, and disproportionately impacting Iraq's southern region. People generally perceive themselves as having to bear the burden of water scarcity due to Iraq and Turkey's inability to reach an agreement.

Members of displaced communities in all governorates conceptualize the construction of large infrastructure projects within regional climate changes. Dam building was not just political, as most officials perceive it, but as a necessary measure Turkey and Iran have to undertake to address extreme heat waves and lack of rainfall within the region. In this context, individuals expressed frustration with Iraq's lack of dykes for water storage in the southern parts of the country. Alternatively, the Director of the Directorate for Water Resources in Dhi Qar traced the issue to the 1980s and the absence of large infrastructure projects such as dams to store water. Mr. Hussien Ali Hussien of Dhi Qar's Directorate of Water Resources stipulated that Iraq, especially its southern region, is bearing the burden of years of wars and negligence of development projects. While neighboring countries such as Syria, Iran and Turkey were building dams and erecting large infrastructure projects, the Ba'athist regime in Iraq "was busy fighting

neighboring countries."[255] The water sector was further destroyed during the sanctions in the 1990s and the subsequent 2003 War. Canals, dykes and other water distribution infrastructure measures in southern Iraq have not yet been reconstructed to levels sufficient enough to manage water in the region. Thus, all groups agreed that there was a lack of infrastructural development projects necessary to store water and address water scarcity.

Local Factors

Perceptions of Impingement on Water Shares

There were local factors that contributed to water scarcity. The factors were mainly related to governance and mismanagement of water services. Virtually all southern Iraqis perceived internal factors of mismanagement of water resources as a cause for dwindling water resources. Every person that was interviewed—community members, state officials, and civil society alike—expressed issues with the mismanagement and distribution of water in Iraq, both between and within the governorates of the country. The exact nature of their issue depended on their location, geographically—along the course of rivers—and socially. Marsh dwellers and farmers raised particular issues with not receiving their fair share of water. For them, this violates the annual water distribution plan that is issued on a yearly basis by the Ministry of Water Resources. They all contend that each governorate overuses its water quota thereby impinging[256] on the water shares allocated for subsequent governorates. Governorates located on the upstream of the two rivers withhold water and do not release enough of it to their southern governorates, thus violating the annual directive of the Ministry of Water Resources. For Dhi Qar, its buffalo

[255] "Interview with Civil Society Activist." November 29, 2017. Dhi Qarriya, Iraq.
[256] The Arabic translate "Tajawzat" literally translates to trespassing, but does not have the legal implications of the English word "trespassing." Thus, I use the word "impingement" on water shares between and within governorates to avoid confusion.

herders have to constantly move upstream and downstream to adjust to the changing levels of water throughout the year. In a similar vein, upstream farmers and fisherman within and between governorates overuse their allotted shares of water thereby impacting the levels of water in the southern parts of the governorates (see Figure 5). One buffalo herder on the Central marsh explained the issue of unfair distribution of water stating:

> The minute the Euphrates enters Iraq, every governorate impinges on its share that violates the annual plan sets forth by the Ministry of Water Resources, especially during the dry seasons between April and November. And within the period, farmers along the way also impinges on their shares by installing additional and unlicensed water pump stations on the river and its branches leaving the southern region in general and the marshes in particular with the last drop of the rivers.[257]

Community groups and individuals that were interviewed as well as advocates and civil society groups and affiliates acknowledged and sympathized with individuals who impinge on others' allocated shares since some of these individuals indicated that they were forced to do so because the annual plan does not meet their water needs to cultivate or herd their animals. In fact, a civil society activist in Missan governorate highlighted the difference in perceptions of impingement between officials and community groups: "officials like to heavily draw on the issue of impingement within governorates, however, less than 5 per cent of the water scarcity issue in the south is related to this factor."[258] For civil society groups and displaced communities, impingement, while necessary to address, is a marginal factor in the issue of water scarcity in comparison to issue of climate change. This may explain why residents of southern Iraq frequently observe their neighbors taking water with unlicensed pumps but take no action (see Figure 9). One farmer explained, "if other farmers had enough water, they would not overuse their shares of water. Their shares are not enough and there is no rain. How is a farmer going to

[257] Interview with Marsh Dweller." December 25, 2017. Missan , Iraq.
[258] "Interview with Civil Society Group." December 25, 2017. Missan , Iraq.

farm with no water?" Empty and unmaintained irrigation canals are a common sight throughout the region (see Figures 10 and 1). Thus, communities acknowledge that internal management of water resources is an issue. They perceive it as an unintended consequence of climate change and its impacts on water scarcity.

Figure 9 Impingement: an unlicensed pump taking water from a canal in Al Qadyysiah. Tiba Fatli, Al Qadyysiah,, Iraq, December 10, 2018.

Figure 10 and 11 southern Iraq's water management infrastructures has not fully recovered from the dual threats of war and climate change. Many canals have been destroyed and the canals that do exist are unmaintained and hold little water. Photos taken during the fieldwork. Tiba Fatli, Al Qadyysiah, Iraq, December 10, 2018.

Farming Methods

Perceptions of impingement, or as some officials call it, "water theft," prevailed when marsh dwellers took issue with farmers in governorates with high levels of agricultural activities, particularly Al Qadyysiah , Nejaf and Hellah. Marsh dwellers explained that the flood method of irrigation being utilized by farmers in these governorates is incompatible with the current levels of water, and is an inefficient technique for irrigation. Marsh dwellers blame farmers for contributing to water scarcity by continuing to use flood irrigation when more efficient technologies like drip and spray exist. Farmers are perceived to have a disproportionate share of the water resources, compared to animal herders and fishermen in the marshes. This is because around 75 per cent of Iraq's water is used by the agriculture sector for irrigation and food production, while 18 per cent is allocated for industrial and municipal usage and marshlands—divided equally between the two; the rest is allotted to fish farms and livestock.[259]

[259] "Strategy for Water and Land Resources of Iraq 2015-2035." Iraq's Ministry of Water Resources. 2014. Retrieved from the Ministry of Water Resource library in Baghdad, Iraq.

Thus, water distribution is a point of contention between farmers and marsh dwellers. Farmers in Al Qadyysiah governorate indicated either that they were open to new methods of irrigation but were not willing to switch the crops they cultivated, or dismissed the option as insufficient for addressing a severe water crisis that is threatening the country. Farmers who say they are willing to change irrigation methods but not crops limit the possibilities for water conservation. This is because many crops irrigated with flood irrigation could be compatible with spray methods but drip—the most water efficient method—is not easily compatible with field crops like rice and barely. Civil society groups stressed the issue of insufficient and outdated farming methods and acknowledged that while the common irrigation methods have been employed since Sumerian times, it is no longer a practical choice given the current state of water resources. In fact, Nature Iraq is currently running test trials of drip and spray irrigation techniques to introduce a more efficient irrigation system. All agreed that irrigation methods were only an issue when there is no rainfall and farmers irrigate their rice fields consuming large quantities of water when doing so.

Patronage Networks and Perceptions of Farmers

Almost all farmers perceive patronage networks as a reason for the depletion of water resources. Corruption occurs as a part of these networks and the unfair distribution of water resources is perceived as severe in agricultural lands. A few of the farmers pointed to fully cultivated lands owned by tribes with ties to the local government—a rare occurrence since the droughts of 2008. For example, some residents are able to obtain licenses for multiple water pumps to run water from local river branches to irrigate their farms, thereby reducing the amount of water available for neighboring farm lands to the south and downstream of the marshes.

Another water management issue community members raised is the irregular and inconsistent water amounts discharged from the gated dams. Discharges of water were viewed as being unbalanced and not on par with seasonal demands. This is particularly true for farmers who were not receiving enough during cultivation season and more than they needed during harvesting. For farmers, issues of water scarcity were contextualized within a larger and more problematic agenda of "killing the farming industry." Several farmers contended, "the government's policy is killing the farmer." This translated into their perceptions of the government's failure to deliver basic water management services that were received prior to 2003, including cleaning the lakes and branches of the rivers, providing sewage treatment, and the like. Local governance was perceived as being negligent in delivering basic water services to farmers. Fair distribution of water resources appears to be one of the common perception and explanation for the situation of people in southern Iraq.

Policymakers perceived water scarcity as a political matter and an internal governance failure. For the majority of the officials that were interviewed, there was no water scarcity. Rather, the issue was limited to water shortages experienced by southern Iraqi governorates during the dry season. For them, the largest factor in seasonal water shortage is unequal distribution of water resources between and within governorates. This is blamed on impingement of governorates and individuals into others' shares. Some officials went so far as to call individuals who install unlicensed water pumps on branches of the rivers as "water thieves." Every director of the Directorate of Water Resources, Directorate of Environment, and Directorate of Agriculture, in all three governorates, articulated their frustration with governorates that borders them in the north which do not release the annual agreed upon water shares to the neighboring governorate

to the south. This issue was particularly stressed during interviews with the directors of the Directorate of Water Resources.

The difference between the perceptions of officials versus community members living on or by the water became stark when issues of farming and irrigation were discussed. Officials, particularly those from the Directorate of Agriculture, expressed concern with the "culture of Iraq's farming," as it was termed by the Director of the Directorate of Agriculture in Al Qadyysiah . He linked the issue of water shortage with the water usage methods irrigating rice fields. The official deemed Iraqi farmers "lazy…uncivilized and [too] inept to learn new methods of irrigation."

While the issue of irrigation was discussed with community members, the perception of the Iraqi farmer and her/his violation of water shares was perceived differently. While community members felt compelled to install extra water pumps to irrigate their land due to the regional water crisis, officials directly linked issues of water scarcity to this practice. In fact, the director of the Directorate of Water Resources in Al Qadyysiah indicated: "If farmers adhere to the distribution of water set forth by the annual plan, the water would be enough. The farmers don't commit to the water plan." In light of this issue, officials conveyed frustration with the political decentralization of Iraq's government post 2003 and the CPA's policies. Prior to 2003, directors of Water Resources Directorates around the country had the power to fine and impose punishments on those who violated their share of water determined by the Directorate of Water Resources by installing unlicensed water pumps or running pipes to the rivers without permission of the Director. However, this privilege was dissolved after 2003. Directors of the Directorates complained that they are unable to address issues of violations; instead, they have to

issue a complaint to the local court which takes an average of six months at which time the farming season passes, the farmer is no longer overusing their allocated share of water and the complaint is consequently dropped. These changes were perceived as a major barrier in addressing water scarcity and a direct cause of water scarcity in the south of Iraq.

The decentralization and policy changes post 2003 were also viewed as a reason for the additional governance issues of mismanagement, miscommunication and lack of cooperation between ministries. While conducting the interviews, I heard multiple accounts and confusion by Directorates about the role of the Directorate of Environment particularly, and the Directorate of Water Resources, generally. In some cases, the Directorate of Environment was perceived as being a research center, while at other times it was thought of as a Directorate that addresses environmental issues in the governorate such as air and water pollution.

Transnational Factors

Transnational factors were also mentioned during the interviews with communities, concerned with oil fracking in the rivers and commodification of water.

Presence of Corporations

Commodification and privatization of water resources in Iraq was only mentioned among displaced communities. While privatization and investment was not explicitly mentioned during the interviews with communities, individuals identified trends of growing investment in southern parts of Iraq, especially in Basra. A group of women in Missan linked the pollution of their waters to fracking and oil drilling when expressing growing concerns about their families'

health.[260] The interviewees did not explicitly identify the names of companies or actors involved in drilling, they indicated that they have observed a growing presence of entities involved in drilling. This, people indicated, is a contributor to the pollution and poor water quality which forces them to buy water for drinking and other household purposes. Farmers raised particular concern with the lack of agricultural equipment and the Directorates absence in maintaining and cleaning irrigation canals. As a result of this perceived state retreat, community members rent their own equipment to maintain canals and other water management infrastructure. This extra expense is incurred by farmers and benefits private owners of equipment and fuel. More importantly among farmers and herders are the government's welcoming responses to foreign oil investors in southern Iraq. Farmers in particular claimed that the government continues to decrease the allocated water for irrigation yearly while increasing oil investment contracts, which they understand requires water for extraction. Individuals indicated that they understood there is a severe lack of water and droughts in Iraq which impacts the amount of water allocated to irrigation, but they did not understand why they see an increasing present of foreign oil companies that drill in their rivers.

The commodification of water within the last decade and a half was a serious concern for all participants. Iraqis perceived water as a right that they did not have to pay for, until recently. A farmer in Al Qadyysiah questioned the lack of drinking water in Iraq and the growing presence of foreign water bottles. He questioned "Why are we drinking imported water from dry Jordan when Iraq has far more water resources? They first pollute our rivers, dry them out and sell us imported water." The sudden emergence of water bottles since 2003 was perceived as an

[260] Individuals identified that there an increase of fracking and drilling activities in the past decade has not been observed in the past.

anomaly across all respective governorates, and even among the marsh dwellers who are considered to be the most isolated group in southern Iraq.[261] Community groups did not refer to a specific entity or person as being responsible for the commodification of drinking water rather they often used an unidentifiably "they" or "we don't know."

From my observations, international and local companies sell bottled water in Iraq such as *Oasis*[262] *Nestle* and local private companies such as UB-Holding's *Life*, *Lolav* and *Lava* water.[263] Perceptions among southern Iraqi communities of companies that sell water is similar to what Linton describes as the process modern abstraction of water.[264] People understood the commodification of water as a process that strips Iraq's water from its social and environmental relationship to its people in the south because the commodification of water does not take into consideration the extent to which people rely on water in terms of farming, fishing herding, cleaning, eating, drinking, and bathing if they can afford to purchase water.

Lack of Water Services and Poor Quality of Water Resources

The commodification of water addresses the perceptions of people mainly with regard to the reduction of the quantity of water. An important issue of water governance is not only the deprivation of quantity, but also of quality. All participants expressed concerns with the quality of water, and the lack of water facilities to provide drinking water and services to clean the rivers. In all governorates and all groups, people expressed concerns with the lack of sufficient

[261] There are many issues with the quality of water in Iraq. Read: Younes, Mohammed and Al Dulaimi Ghassan, "Assessment of Potable Water Quality in Baghdad City, Iraq." Air, Soil and Water Research. 2017. Access at < http://journals.sagepub.com/doi/full/10.1177/1178622117733441>
[262] "International Contracts." Oasis International. Access at <http://www.oasiscoolers.com/index.php/sales-team/?c=Iraq>
[263] "Decades of Experience: Abdul Nezir dicsuses the role UB Holding and its subsidiaries, specifically legacy construction, Ahram food factory, burak logistics, and Iraq oil, have played in the development of the Kurdistan region." Invest Group. 2013. Access at <http://investingroup.org/interview/68/>
[264] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010. Pg. 3

sewage treatment centers and dysfunctionality in the existing ones. Community members expressed their concerns at the lack of services. Officials viewed this issue as the responsibility of the central government in Baghdad which is tasked with contracting service providers. Both the central government and the governorate Directorate of Water Resources failed to provide services to governorates in southern Iraq. As of 2015, it was reported that Dhi Qar was far below the 86.6 per cent national average of access to drinking water and only one fifth of the population relied on the public sewage system as the primary method of disposing of waste water.[265] Similarly, Missan and Al Qadyysiah are below the national average and only 60 per cent and 15 per cent, respectively, are connected to sewage network systems.[266]

ISIS

In addition to the international and internal factors that are perceived to cause the scarcity of water, the occupation of Mosul and western parts of Iraq by ISIS was briefly mentioned by a few officials and community members. The impact of ISIS on Iraq's water issues was not reflected during the fieldwork. However, there is plenty of literature on the implications of ISIS when analyzing the issue of water scarcity in Iraq post-2014.[267] Few explicitly acknowledged that ISIS' control of upstream water resources and the Mosul Dam caused severe drought in the southern Iraqi governorates in 2015. Individuals indicated that within the overall issue of droughts and scarcity that they often traced to 2008, the lack of rainfall and climate issues were a bigger concern and a larger contributor to the shortage of water resources than ISIS.

---

[265] "Thi-Qar Governorate Profile." NGO Coordination Committee for Iraq. 2015. Access at < https://ncciraqbids.com/images/infobygov/NCCI_ThiQar_Governorate_Profile.pdf>

[266] "Thi-Qar Governorate Assessment Report." UNHCR. 2006. .Access at <http://www.unhcr.org/45db062f2.html>

[267] DuBois King, Marcus. "The Weaponization of Water in Syria and Iraq." *The Washington Quarterly* 38, no. 4 (2016): 153-169; Mazlum, Ibrahim. "ISIS as an Actor Controlling Water Resources in Syria and Iraq." in *Violent Non-State Actors and the Syrian Civil War* eds. Özden Zeynep Oktav Emel Parlar Dal Ali Murat Kurşun (Springer International Publishing, Istanbul, 2018); Pearce, Fred. "Mideast Water Wars: in Iraq, a Battle for Control of Water." Yale Environment. 2014. Access at < http://e360.yale.edu/features/mideast_water_wars_in_iraq_a_battle_for_control_of_water> ;Sly, Liz. "Islam's Dysfunctional State: in Isis-controlled Syria and Iraq Everyday Life is Falling Apart." Washington Post. 2014. Access at < http://www.aina.org/news/20141227124144.pdf>

Generally speaking, ISIS' control of the Mosul and Haditha dams were discussed more with officials than community members. The control of ISIS over water facilities and infrastructure was perceived as a reason for issues of reductions in water quality and quantity. More importantly, however, is the reallocation of government funds towards the Ministry of Defense to fight ISIS. This was perceived to have diverted funding away from other Ministries, such as the Ministry of Water Resources, and then paralyzing their work.

Conclusion

This Chapter presented the perceptions of people in southern Iraq on water scarcity and its causes. The Chapter outlined the perceptions based on how they were described to the author during the fieldwork in south Iraq. Overall, climate change appears to be more visible for community members and internal factors of governance were mostly discussed among officials. Communities stressed issues of commodification of water, internal mismanagement of water shares and dwindling quality of water resources.

Chapter Five:

Production of Water Scarcity: Perceptions and Reality

"Water is not about water. Water is about building people's institutions and power to take control over decisions."

Sunita Narain [268]

Introduction

Chapter Five analyzes the relevant internal, external, and transnational factors that affect Iraq's water scarcity and contribute to population displacement. It considers the extent to which policymakers and displaced populations understand these factors. It also looks at the implication of differences between perceptions and reality. Section One assesses data on water scarcity in southern Iraq. Section Two analyzes the difference of opinion between the published data provided and the perceptions of policymakers and affected communities. Section Three delves into the implication of these differences. I argue that water scarcity is a product of the interactions of internal, international and transnational factors, and that perceptions of water scarcity are produced through specific relations and modes of knowledge influenced by international, national and transnational factors. My analysis relies on Linton's concept of "hydroelectics",[269] and Chimni's critique of international institutions and the emerging nascent global state.[270]

[268] Mishra, Nivedita. "Sunita Narain gets top water award." Hindustan Times. 2005. Access at <https://www.hindustantimes.com/india/sunita-narain-gets-top-water-award/story-ELYH5vITZP8uF7aUJQBQBO.html> ; and Quoted in Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.
[269] *Ibid.*
[270] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.

Factors Affecting Iraq's Water Resources

There are a number of factors that impact the quantity and quality of water resources in Iraq. These include, climate change, regional development projects, and internal governance issues.

International and Regional Factors

As outlined in the introduction of this thesis, water resources in Iraq are threatened by anthropogenic climate change, which disproportionately impacts regions in the global South.[271] While the dearth of data makes climate change analysis difficult in the MENA region, there are several studies that do observe a regional change in the frequency and severity of heatwaves, precipitation levels, and lengthening of dry seasons.[272] Studies indicate that heatwaves are increasing by at least an average of .0036 C per year, [273] while precipitation is decreasing in the region of Eastern Mediterranean, Turkey, Iraq, Syria, Iran, and the Caucasus (see Figure 1).[274] The abrupt and severe weather variation in Iraq, as many affected communities explain, is the result of a regional change in climate. Southern Iraqis' perceptions of climate change, particularly the farmers' and marsh dwellers' opinions concerning the drastic and unprecedented heatwaves experienced in Iraq's southern regions, are consistent with what the published data reveals.

---

[271] *See* Intergovernmental Panel on Climate Change, *Climate Change 2001: A synthesis Report, A contribution of Working Groups I, II, and III to the Third Assessment Report of the IPCC, ed. R.T.* Watson and the Core Writing Teams. Cambridge University Press. *See also* Shannon Brincat's "Global Climate Change Justice: From Rawl's Law of Peoples to Honneth's Conditions of Freedom" and Isabel Mota Borges "Environmental Displacement and John Rawl's 'General Conception' of Justice for more information on climate change and justice.

[272] Jallo, Nada. "Evidence of Climate Change in the Middle East." *Journal of Asian Scientific Research* 3, no. 12 (2013) 1148; Evans, Jason and Hoell Andrew. "A Review of Drought in the Middle East and Southwest Asia." *American Meteorological Society* 29 (2016): 8547-8574; Barlow, Mathew, Zaitchik, Benjamin, Paz, Shelmoit, Black, Emily, Evans, Jason and Hoell Andrew. "A Review of Drought in the Middle East and Southwest Asia." *American Meteorological Society* 29 (2016): 8547-8574; Pearce, Fred. "Fertile Crescent 'Will Disappear This Century'." News Scientict. 2009. Access at < https://www.newscientist.com/article/dn17517-fertile-crescent-will-disappear-this-century/>

[273] Jallo, Nada. "Evidence of Climate Change in the Middle East." *Journal of Asian Scientific Research* 3, no. 12 (2013) 1148.

[274] Evans, Jason and Hoell Andrew. "A Review of Drought in the Middle East and Southwest Asia." *American Meteorological Society* 29 (2016): 8547-8574

Communities' perceptions on the link between Iraq's climatic situation and neighboring countries is reflected in the data. They perceive Iraq's vulnerability to extreme weather conditions as part of a broader regional change in climatic conditions. Southern Iraq experienced its hottest summers and the worst droughts in the years 2007, 2008-2009, 2014-2015, and 2017.[275] Affected communities have also expressed concern regarding the general lack of rainfall and the change in the length of the dry seasons throughout the past decade. Farmers and animal herders argue that it has impacted irrigation seasons, led to an abandonment of farm lands, and killed animals in the region. Beginning in 2008, Iraq indeed experienced significant increases in the length of the dry seasons, substantially decreasing the period of time during which the rangelands are grazable. Farmers have coped by increasing importation of water and feedstuffs and a decreasing of the herd sizes. [276] In 2012, the Government of Iraq reported that of the country 28 per cent arable land, 100,000 dunums was lost each year to degradation. Meanwhile, 39 per cent of Iraq's surface was estimated to have been affected by desertification, with an additional 54 per cent under threat.[277] IOM found that in 2012, 40 per cent of Iraq's total cropland had suffered a significant reduction in productivity and livestock was devastated.[278] These weather events are linked to climate change.

As outlined in Chapter One, the link between climate change and displacement is categorized into sudden-climate events and slow-onset weather events. Southern Iraq is facing the latter.

[275] Barlow, Mathew, Zaitchik, Benjamin, Paz, Shelmoit, Black, Emily, Evans, Jason and Hoell Andrew. "A Review of Drought in the Middle East and Southwest Asia." *American Meteorological Society* 29 (2016): 8547-8574; Barlow, Mathew and Hoell, Andrew. "Drought in the Middle East and Central-Southwest Asia During Winter 2013/14." *Special Supplement to the Bulletin of the American Meteorological Society* 96, no. 12 (2015): 71-75; "Water Shortage Threatens Two Million People in Southern Iraq." The Guardian. 2009. Access at < https://www.theguardian.com/world/2009/aug/26/water-shortage-threat-iraq>; Pearce, Fred. "Fertile Crescent 'Will Disappear This Century'." News Scientict. 2009. Access at < https://www.newscientist.com/article/dn17517-fertile-crescent-will-disappear-this-century/> ; This was also indicated by both community members and policymakers.

[276] Evans, Jason. "21st Century Climate Change in the Middle East." *Climate Change* 92, no. 3-4 (2008): 417-432.

[277] "Climate Change in Iraq." Relief web. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Climate%20change%20In%20Iraq%20Fact%20sheet%20-%20English.pdf>

[278] "Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >

Slow-onset events mentioned above such as desertification, land degradation, and drought are decreasing the size of arable land and herd size in southern Iraq, and slowly making parts of the region inhabitable and difficult for farmers and herders to sustain their traditional livelihoods. These weather events form "push" factors for farmers and animal herders in southern Iraq to migrate, largely within the country. As frequent droughts hit farmlands, Iraqi farmers are forced to leave their farms to find livelihoods elsewhere, in urban centers closest to their place of origin. Buffalo herders are also forced to relocate[279] As Mayer claims, "no disaster is ever *entirely* natural",[280] and climate change does not alone produce water scarcity; it also interacts with political and internal factors that continue to exacerbate the water crisis in the south of Iraq and push people to move.

[279] "Interview with head of Farmers Union in Al Qadyysiah and Dhi Qar." December 2017. Southern Iraq.
[280] Mayer, Benoit. "Who are "Climate Refugees"? Academic engagement in the post-truth era." in *Climate Refugees? Beyond the Legal Impasse* eds. Simon Behrman and Avidan Kent (Earthscan from Roughtledg London and NY, 2018) 89

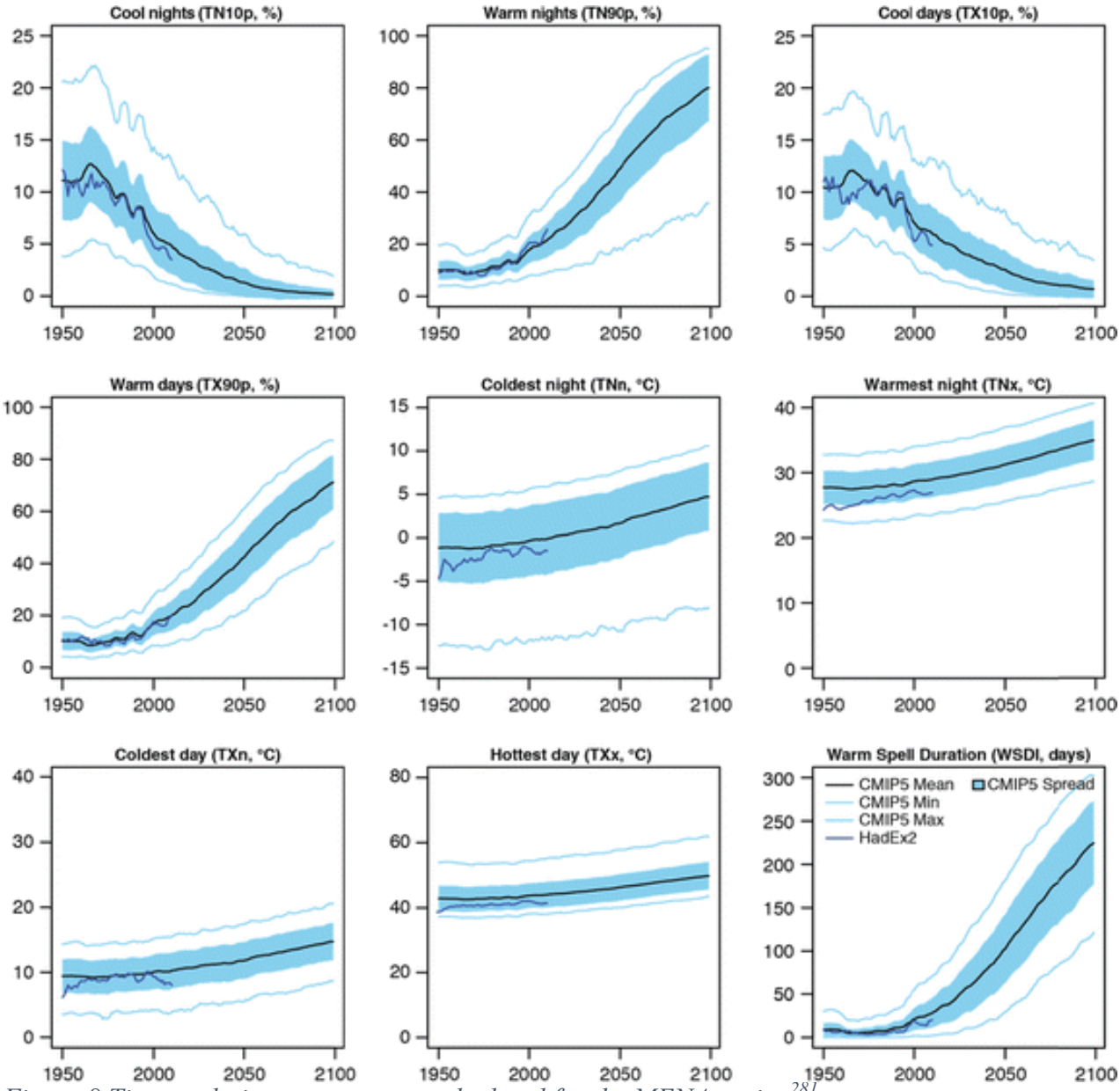


Figure 8 Time evolution temperature calculated for the MENA region[281]

Politics, Water, Displacement, and Regional Tensions

National Development Projects

[281] Leieveld, J, Proestos, Y, Hadjinicolaou, P, Tanarhte, M, Tyrlis, E and Zittis, G. "Strongly increasing Heat Extremes in the Middle East and North Africa (MENA) in the 21st Century." *Climate Change* 137, no. 1-2 (2016): 245-260.

In addition to climate change, water scarcity is further impacted by reduction in the flow of the two main rivers, the Tigris and the Euphrates, fueled by regional development projects. This factor is perceived to be a cause for scarcity mainly among policymakers. A year following the drought of 2008, Iraqi members of Parliament claimed that rainfall had not actually fallen below normal levels in Iraq and that the country's water shortage was a direct consequence of Turkey's national development policies that have taken a drastic shift in the 1980s and onwards.[282] The majority of policymakers interviewed dismissed communities' perceptions of unprecedented weather conditions, explaining that Iraq had experienced similar hot years in the 1980s.[283] Policymakers' remarks on Iraq's weather contradict scientific evidence on climate change showing that Iraq's recent rainfall reduction has been abrupt and severe. Many officials in southern Iraq did agree that the lack of rainfall and heatwaves that have hit Iraq play a role in water scarcity but view it as a normal climatic cycle of changing weather conditions. For the policymakers, the most pertinent international and regional factors that impact water flow in Iraq are the development policies of Turkey and Iran that are perceived to be rooted in political objectives and not only economic development per se. Beginning in the 1960s and 1970s, Turkey started building dams along the Tigris and Euphrates to develop its hydropower capacities and adapt to climate change, consequently reducing water flow to its neighboring country. Iran implemented similar projects beginning in the 2000s. The narrative that water scarcity is largely caused by dam building in neighboring countries is regularly proposed by politicians; the only communities which referenced these policies were ones with televisions, they would reference that they derive this information from listening to the news and the views of policymakers. And

[282] Jongerden, Joost. "Dams and Politics in Turkey: Utilizing Water, Developing Conflict." *Middle East Policy* 17, no. 1 (2009):137-143.
[283] "Interviews with the Directors of the Directorate of Environment." December 2017. Southern Iraq

even with that perception, communities still considered dam building to be a secondary issue; not one person among the affected communities, downplayed the severity of climate change.

Southern Iraqis' perception of the implications of dam construction and the impact it has on water availability is rooted in reality. The annual discharge of the Euphrates and Tigris Rivers has been in steady decline and the discharge is predicted to be reduced by 9.5 per cent by 2040.[284] Specific to the region of southern Iraq, the flow has also been severely impacted by the extensive dam and hydropower construction in Turkey and Iran. Communities and policymakers heavily stressed this issue. Upstream dam construction projects have increased since the 1960s, reducing the flow of the two rivers by approximately 80 per cent.[285] In addition to these dam building projects, this percentage is further impacted by the decline in rainfall and changing weather conditions.

Iraq and its neighboring countries have a long history of tensions over dam construction. The politicization of dam construction in Turkey and Syria goes back to 1975 when the Keban Dam in Turkey and the Tahba Dam in Syria were built. The Keban Dam was solely a hydropower project and caused no loss of water to the downstream riparian state. This was followed by the construction of the Karakaya Dam, further downstream from Keban in Turkey in 1967 and the Ataturk Dam in Turkey in 1980. Initially, the Iraqi government was ambivalent to the Turkish dam construction, but this changed in the 1990s when the flow of water from the Tigris and Euphrates impacted Iraq's water resources. These major dam constructions initiated the Southeastern Anatolia Project of Turkey (GAP) in 1980 which are believed to be politically

[284] Bozkur, Deniz and Sen, Omer Lutfi. "Climate Change Impacts in the Euphrates-Tigris Basin Based on Different Model and Scenario Stimulations." *Journal Of Hydrology* 480 (2013): 149-161.
[285] Wilson, Ryan. "Water-Shortage Crisis Escalating in the Tigris-Euphrates Basin." *Future Directions International.* 2012. Access at < http://www.futuredirections.org.au/publication/water-shortage-crisis-escalating-in-the-tigris-euphrates-basin/>

rather than developmentally, motivated.[286] Turkey signed an agreement with Iraq in 1984 to provide a minimum water flow of 500 cubic meters per second in the Euphrates. Conflict became a possibility in 1990 when Iraq and Syria believed that Turkey deliberately reduced their water share to fill the reservoir for the Ataturk Dam reducing the water of Syrian and Iraqi water temporarily by 75 per cent.[287]

Today, the regional water struggle is once again heating up. The GAP project intends to construct twenty-two large dams including the Ilisu Dam, and nineteen hydropower plants in the Euphrates and Tigris River Basin to produce electric power and provide irrigation for 1.7 million hectares of land.[288] Twelve large dams and more than 80 per cent of the Ilisu Dam have already been completed.[289] Civil society groups and policymakers are particularly concerned about the Ilisu Dam. Its largest hydroelectric power project on the Tigris River is 135 meters high, at 526 meters ground elevation with 10 million cubic meters storage capacity.[290] This dam is located 65 kms upstream from the border with Iraq and Syria at the village of Ilisu along the Tigris River. It has the potential to reduce by 56 per cent the flow of the river's water into Iraqi territory.[291]

Over the years, both Iraq and Syria filed many claims against Turkey accusing it of withholding water and causing water shortages.[292] In response to Turkey's dam building, the Iraqi Parliament pressed the government to demand greater share of water from Turkey in 2009. The Members of Parliament voted to compel the Iraqi government to include an article in any agreement signed

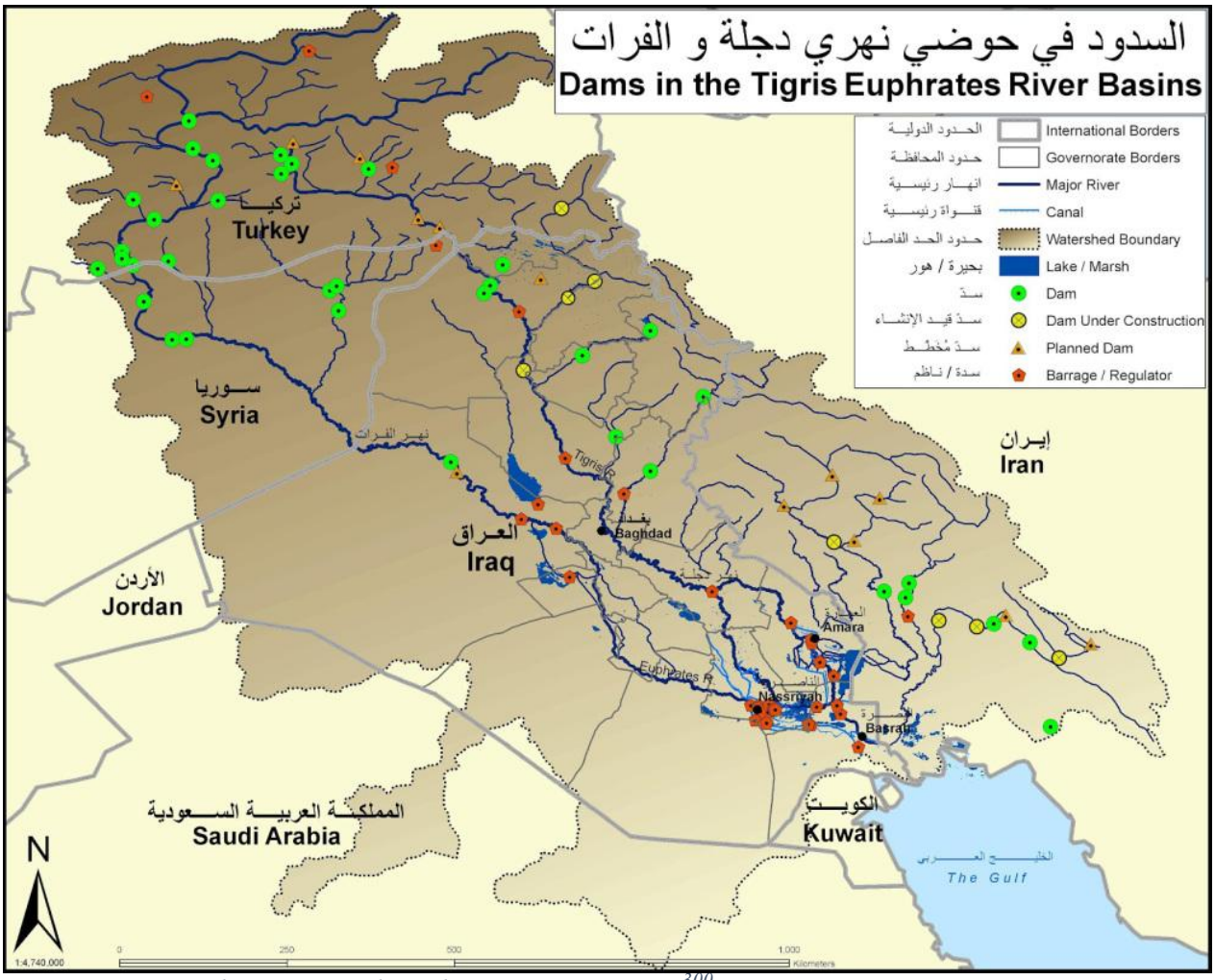
[286] Maden Evrim, Tugba and Kibaroglu, Aysegul. 2014. "An Analysis of the Causes of Water Crisis in the Euphrates-Tigris River Basin." *Journal of Environmental Studies and Sciences* 4, no 4 (2014): 347-353.
[287] *Ibid.*
[288] Morvaridi, Behrooz. 2004. "Resettlement, Rights to Development and the Ilisu Dam, Turkey." *Development and Change* 35, no. 4 (2004): 719-741.
[289] *Ilisu Dam,* Ministry of Foreign Affairs, Turkey. Access at < http://www.mfa.gov.tr/ilisu-dam.en.mfa>
[290] Morvaridi, Behrooz. "Resettlement, Rights to Development and the Ilisu Dam, Turkey. *"Development and Change* 35, no. 4 (2004): 719-741.
[291] *Ibid* and "Imminent Danger of Turkish Dam for Iran, Iraq." *Financial Tribune.* 2017. Access at < https://financialtribune.com/articles/environment/76236/imminent-danger-of-turkish-dam-for-iran-iraq>
[292] [292] Morvaridi, Behrooz. "Resettlement, Rights to Development and the Ilisu Dam, Turkey. *"Development and Change* 35, no. 4 (2004): 719-741.

with Turkey or Iran to ensure Iraq gets its fair water share.[293] Turkey and Iraq held talks in 1980; and in 2009, Syria and Iraq held a crisis summit in Ankara, Turkey to discuss the issue of droughts. No agreement was signed but Iraq, Syria and Turkey signed a Memorandum of Understanding to strengthen communications within the Tigris-Euphrates Basin.[294] In more recent years, Iraq's Minister of Water Resources has pushed for diplomatic talks with Turkey on water sharing problems and has established the Department for Partnership with Civil Society and Communities to engage civil society groups in these efforts.[295] Talks between Turkey and Iraq are ongoing and Iraq is pushing to sign a bilateral agreement on water shares in the Tigris and Euphrates River Basin.[296] In addition to Turkey, Iraq is also negotiating talks with Iran on issues of water shares concerning the Hewaizah Marsh.[297]

Iran dam construction on the Kharkha and Karun Rivers has also impeded water flow into Iraq particularly along the Kharkha River (see Maps 9). [298] These controversial hydropower projects have raised more concerns among policymakers and civil society groups, sectors which view dams as a primary threat to Iraq's water resources. This perception is not shared with affected communities who, as indicated in Chapter Four, perceive the water scarcity problem as primarily a climate change issue. The construction of the dams on the Iranian side is mainly problematic for the buffalo herders and farmers in Missan governorate. The marsh dwellers in Missan as well as the farmers who rely on the Hewaizah marsh have been greatly impacted by the construction

[293] Jongerden, Joost. "Dams and Politics in Turkey: Utilizing Water, Developing Conflict." *Middle East Policy* XVII, no. 1 (2010): 137-141.
[294] Jongerden, Joost. "Dams and Politics in Turkey: Utilizing Water, Developing Conflict." *Middle East Policy* XVII, no. 1 (2010): 137-141.
[295] "Water Activists Meet Privately with the Minister of Water Resources, Dr. Hassan Al-Janabi." Iraqi civil Society Solidarity Initiative. 2017. Access at < http://www.iraqicivilsociety.org/archives/7149>; "Iraqi delegation to visit Turkey over water dispute." Press TV. 2018. Access at < http://www.presstv.com/Detail/2018/02/18/552772/Iraq-Turkey-Tigris>; "Iraq-Turkey water policy leaves Iraq dry." Arab News. 2018. Access at < http://www.arabnews.com/node/1223796/middle-east>
[296] *Ibid*.
[297] "Report on a Ramsar Team Visit to the Hewaizah Marsh Ramsar Site, Iraq." *Ramsar*. 2014. Access at < https://www.ramsar.org/document/report-on-a-ramsar-team-visit-to-the-hawizeh-marsh-ramsar-site>
[298] Adib, Arash, Foladfar, Hesam and Roozy, Amir. "Role of Construction of Large Dams on River Morphology (Case Study: the Khrkheh Dam in Iran)." *Arabian Journal of Geoscience* 69 (2016): 661.

of these dams. In some areas of the Hewaizah marsh, water levels have dropped as low as 30 cms. As a result, those in Missan who are no longer able to fish, herd animals, or farm are forced to move upstream for water or migrate to Iran.[299]



Map 8 Dams on the Tigris and Euphrates River Basin. [300]

Hydropower development projects in Turkey are closely linked to national, regional and global development strategies—the same strategies impacting Iraq's water governance. Turkey's hydropower projects on the transboundary rivers of the Tigris and Euphrates are part of Turkey's

[299] "Interviews with displaced populations in Missan " December 25, 2017. Missan , southern Iraq.
[300] Holmes, Keith. "Dams in the Tigris Euphrates river basins" *University of Victoria.* 2009. Access at < https://dspace.library.uvic.ca/handle/1828/2400>

neoliberal transformation of their national energy sector and water management system. This process started in the 1980s as part of a Structural Adjustment Program (SAP).[301] SAP is an IMF program that provided conditional loans to Turkey in response to the state's struggles with debt payments and inflation during the 1970s. These conditions included radical reforms in the country's economy to create a hospitable environment for private investors, mainly Western corporations.[302] This program is still in place. Thus, it is not only the Turkish government that is involved in water resource management. Transnational and international actors are also involved in Turkey's national policies. The main financial contributions to Turkey's hydropower projects came after Turkey signed the United Nations Framework Convention on Climate Change in 2004 and ratified the 2009 Kyoto Protocol, without any strict reduction targets in Turkey's carbon emissions.[303] In 2010, Turkey became one of the founding members of the World Bank partnership for Market Readiness Program and soon received a loan from the World Bank to "help increase privately owned and operated energy production within the market-based framework of the Turkish Electricity Market Law."[304] As Islar argues, "Turkey's climate change mitigation and hydropower development constitutes a new phase of neoliberal mission in the Turkish water governance whereby increasing coalitions between Turkey and the World Bank are emerging as well as new investments between European and Turkish companies." [305] The involvement of Western transnational companies in Turkey implies an opaque and diffused form of governance with significant political consequences internally and regionally. [306] The

[301] Law No. 3096 (1984) and Electricity Market Law No. 4628 were part of these reforms introducing principles of build-operate and transfer, build-own-operate and transfer-of-operating-rights. Structural adjustment programs consist of conditional loans provided by the IMF and the World Bank to developing countries that experience economic crisis. Read: Islar, Mine. 2012. "Privatised Hydropower Development in Turkey: A Case of Water Grabbing?" *Water Alternatives* 5, no. 2 (2012): 376-391

[302] Senses, Fikret. "Turkey's Stabilization and Structural Adjustment Program in Retrospect and Prospect" *The Developing Economies* 29, no. 3 (1991): 210-234.

[303] *Ibid.*

[304] "Clean Technology Fund (CTF) investments in Turkey: Comments on Berne Declaration Report." World Bank. 2010. Access at < http://www.worldbank.org/en/news/press-release/2011/10/12/clean-technology-fund-investments-in-turkey-comment-on-berne-declaration-report>

[305] *Ibid.*

[306] Islar, Mine. "Struggles for Recognition: Privatization of Water Use Rights of Turkish Rivers" *Local Environment: The International Journal of Justice and Sustainability* 17, no. 3 (2012): 317-329.

involvement of transnational actors in hydropower projects and water management in Turkey complicates the management of transboundary waters, and thus impacts the flow of the two rivers into neighboring counties. It is important to note that while the World Bank is formulating plans to address water scarcity in Iraq, they are also supporting and engaging in the planning and implementation of hydropower projects in Turkey that are contributing to water scarcity in Iraq.

Development projects are what scholars consider "non-climatic" factors that exacerbate existing climatic conditions and induce displacement.[307] GAP projects in Turkey and dams in Iran interact with the increasingly hot weather in Iraq and the decline in rainfall further altering the flows of the Tigris and Euphrates and their freshwater ecosystems by controlling and diverting water, thereby impacting the amount of water available for downstream populations in southern Iraq. Buffalo herders on the marshes in Dhi Qar and Missan and farmers in Al Qadyysiah, Missan and Dhi Qar are severely impacted by the reduction of water levels, especially because they are situated on the very ends of the Euphrates. However, as Oli argues, migration is not the first response to climate change.[308] The decline in water resources in southern Iraq does not immediately induce displacement. Before a "tipping point" is reached and people decide to move as a result of water scarcity, there are other non-climatic factors that interact with and worsen existing problems of water scarcity before people decide to move. An illustrative example of a non-climatic factor is people's adaptive capacity and vulnerability to changing rivers flows (see Chapter One). Farmers explained that in the past decade, they switched to crops that consume less water compared with the more commonly cultivated crops, barley and wheat. At the same

[307] Richter, Brain, Postel Sandra, Carmen Revenge, Thayer Scudder, Bernhard Lehner, Allegra Churchull and Morgan Chow, "Lost in Development's Shadow: The Downstream human Consequences of Dams." *Water Alternatives* 3, no. 2 (2010):14.
[308] Brown, Oli. "Climate change and forced migration: Observation, projections and implications." UNDP. 2007. Access at < http://hdr.undp.org/sites/default/files/brown_oli.pdf>

time, farmers further indicated that they have been increasingly cultivating less dunums of land each season. In similar ways, buffalo herders choose to pursue other means of adaption such as selling livestock to meet their immediate needs. In many cases, farmers and buffalo herders do not find alternative means of adaptation and need to migrate to nearby urban settings. Marsh dwellers described their movements as being easier than that of the farmers given that all their houses are easily-assembled reed houses, and their water buffalos can survive as long as there is water. Farmers' displacement in Al Qadyysiah, on the other hand, is more permanent and they are less likely to be able to settle in places where they can practice their farming skills.

Pollution of Water Resources in Iraq

Water quality is rarely regarded as an important factor in water scarcity assessment.[309] Nonetheless, water pollution has become a key factor in the exacerbating water problems.[310] Water scarcity is further worsened by pollution ensuing from increased salinity, industrial waste, large infrastructure dam projects in the region, and lack of water and sewage treatment facilities.[311] The low flow rates have impacted the quality of water in Iraq, as communities explained, allowing around 150km of salt water from the Arab-Persian Gulf to infiltrate the rivers.[312] Failed water and sewage treatment systems within and outside Iraq have also impacted the quality of water resources, reducing the amount of potable water especially in southern Iraq. Of the eighteen governorates of Iraq, only ten have wastewater treatment facilities. Around 86 per cent of the urban population and 62 per cent of the rural population have access to an

[309] Kanear, S and Oki, T. "Global Hydrological Cycles and World Water Resources." *Science* 313, no. 5790 (2006): 1068-1072.
[310] Zeng, Zhao, Liu, Jungu, and Savenjie, Hubert. "A Simple Approach to Assess Water Scarcity Integrating Water Quantity and Quality." *Ecological Indicators* 34 (2013): 441-449.
[311] Bremer, Nicolas. "Transboundary Environmental Impact Assessment of Large Damns in the Euphrates-Tigris Region: An Analysis if International Law Binding Iran, Iraq, Syrian and Turkey." *Review of European, Comparative & International Environmental Law* 25, no. 1(2016): 92-106.
[312] *Ibid*.

improved water source through Iraq's water distribution system.[313] Most of the affected communities cite lack of rainfall as the main factor linked to the decline in water quality in the region of southern Iraq as well as the lack of treatment facilities. On the other hand, officials indicated that the conventional and "primitive" methods of irrigation largely contribute to poor water quality because the water table rises through flood irrigation, causing salt to rise into the topsoil, which is then also drained down the rivers.[314] Overall, policymakers attribute the lack of water treatment centers in their governorates to a lack of funding, especially following 2014 when Iraq's Federal Government allocated much of its budget to the Ministry of Defense and drastically reduced its funding.[315]

While the government of Iraq did raise military expenditure in 2015,[316] the lack of water sanitation facilities pre-dates ISIS' presence in Iraq.[317] Similar to perceptions of other factors, all groups perceived the decline of water quality to be a contributing factor in producing water scarcity. Data shows that the pollution in water quality is due to climate change, lack of proper water facilities, as well as use of drainage water in agricultural irrigation and traditional flood irrigation techniques that "leads to water logging, rising groundwater and, subsequently, higher levels of pollution and salinity."[318] As discussed in Chapter Three, transnational and international factors have played a significant role in destroying Iraq's water treatment facilities and contributing to the poor water quality. That is to say, policymakers' and affected communities' perceptions about the causes of poor water quality is confirmed by the data.

[313] "Environmental Survey in Iraq 2010: Water-Sanitation-Municipal Services." UNICEF. 2011. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Full_Report_2732.pdf>
[314] "Interview with Director of the Directorate of Environment." December 17, 2018. Al Qadyysiah , Southern Iraq.
[315] "Interview with Director of the Directorate of Environment." December 21, 2018. Missan , Southern Iraq.
[316] Military Expenditure, Iraq, *Trending Economics; "Interviews with the Directors of the Directorate of Water Resources, Environment and Agriculture."* December & January 2018. Southern Iraq.
[317] Refer to Chapter 3
[318] "Special Report: Water Scarcity and Displacement." IOM-Iraq. 2012. Access at < https://reliefweb.int/sites/reliefweb.int/files/resources/Water%20Scaricity.pdf >

Poor water quality threatens the water buffalos of the marsh dwellers. Marsh dwellers indicated that their decision to move is not only influenced by the quantity of water but the quality as well. Their lives are attached to their water buffalos—when their buffalos don't endure contaminated water, they have to move to areas with less contaminated water. For displaced farmers, the poor quality of water has a bearing on the quality and quantity of crops cultivated. Their crops are already threatened with low water quantities for irrigation, but in addition the poor water quality of available water sources can damage their crops, reduce agricultural productivity and push them to move.

Factors mentioned above contribute to reducing water levels in southern Iraq. The reduction of water impacts peoples' livelihoods and, in cases becoming increasingly common, is forcing people to relocate. As Chapter Four highlights, the perceptions of water problems between the displaced population and policymakers are different. The next section provides an analysis of the difference in perceptions.

Difference in Perceptions

Water scarcity in southern Iraq extends beyond its just being an internal issue of distribution and access. While the water management and the canal systems do increase tensions and compound water shortages, the scarcity that farmers and marsh dwellers in southern Iraq experience is a result of the country's insufficient water resources. However, defining water scarcity as just a quantitative measure of water, or diminishing quantities of available water obfuscates the bigger

picture.[319] The issues involving water are realized in a specific social and environmental context. To understand the different perceptions of water scarcity, this Section compares the perceptions of affected communities and policymakers, and the different contexts in which perceptions and narratives are shaped about water scarcity. In each section, I consider international, national and transnational factors that interact to produce water scarcity. When comparing the perceptions with available data, two general differences in the perceptions emerge: affected communities draw more on climate change to explain the causes of water scarcity and policymakers draw more on local factors, especially the mismanagement of water resources and "inefficient" farming methods to explain the scarcity.

'Hydroelectics' and Perception of Water Scarcity in Southern Iraq

The difference in the perception and narratives between policymakers and communities is linked to the relationship an individual or a group has with water. Linton coins the term *hydroelectics* to describe this notion:

> Hydroelectics conceives of a water process out of which particular instances of water get fixed, or instantiated, in social relations. Hydroelectics thus complicates the science of abstract water with the idea that we cannot have knowledge of water except in relation to our own circumstance and modes of knowing…knowing and identifying water is necessarily a product of engagement, with engagement itself being the real-that is, relational, substance of both the knower and the known.[320]

As such, Linton proposes that water problems such as scarcity are never just water problems but are a process formed in social and environmental relations. Water and society are not separate. The concept of water is produced through its cultural and environmental context; how societies use it, how it feeds into the society, and how it functions within a specific ecological system. I would also add that not only are problems formed solely in social relations, but in economic and

[319] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.
[320] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.

political relations as well. Through this lens, the narrative of scarcity southern in Iraqi communities is shaped by their engagement and relationship with water as a natural resource—given by God—which is influenced by natural and climatic occurrences. Their observation of climate change on national and regional levels and the depleting and worsening conditions of the river waters' quality is produced by their interaction with water on a daily basis. Communities understand water as it impacts their social context such as herding, fishing, farming and environmental surrounding. They can directly, on a daily basis, observe the changes in their ecological conditions. As such, water problems are perceived within the context of how it alters and impacts their socio-environmental context.

The major difference in the perceptions of policymakers compared with data on water scarcity is the emphasis on national and local actors, and the dismissal of international and transnational, factors, unless it relates to political concerns with Turkey and Iran. While the data reveals that water shortages in Iraq in recent years is a result of abrupt and severe climatic events fueled by national development projects in neighboring countries, policymakers emphasized issues of "good governance," "irrigation methods," and "water mismanagement" to frame the water crisis in Iraq's southern region. Within this context, the "hydro-social" relations[321] with water and the modes of knowledge that shape policymakers' perceptions of water scarcity reflect the "hydro-social" relations and the knowledge of water in international institutions. A narrative that, Linton reminds us, abstracts water from its socio-environmental context reducing it to western concepts of quantity and efficiency that is "*deliberately* non-social and non-historical in a way that the waters of other places and times are not."[322] As a result, water problems are perceived only as a

[321] A term coined by Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.
[322] *Ibid*. Pg. 74

result of reduction in quantities and efficiency in its utilization. Once the perception of water and its scarcity are abstracted from its social context, the solutions to addressing scarcity also extracts social implications of water governance. For example, manipulating water in damming it, diverting it, or creating large infrastructure becomes easier and the human cost, such as displacement, is downplayed.

The perception of water scarcity and its causes, especially among the policy makers, has been largely re-shaped by a neoliberal agenda formulated and bequeathed to Iraqis by international and transnational factors.[323] These factors drives perception and policy at the local and state levels.[324] As Chapter Three describes, the CPA implemented aggressive neoliberal reforms in 2003, which were reflected and enforced by international organizations such as World Bank and the IMF. The Iraqi state's discourse on water scarcity reflects INGOs perceptions. This is the context in which, as "hydroelectics" conceives, water scarcity is produced among policymakers. Policymakers serve to bolster the agenda of international institutions and corporations . Linton argues that once water and its problems are viewed as issues of quantity and efficiency only, not considering the social and environmental context, hegemonic powers such as the state or transnational corporations can manipulate water without seriously considering the social costs like displacement. And so, the western modern way of viewing water has a political agenda and its serves to bolster agendas of powerful institutions like the state and corporations. In similar sense, In similar sense, Chimni also argues that in the name of western concepts of efficiency,

[323] The reason for saying re-shaped is because the state's narrative prior to 2003 on the water is one that drew heavily on the role of international actors in producing scarcity in the south.
[324] Refer to Chapter three

good governance, modernization and technological advancement, the agenda of transnational capital is advanced.

Principles of "good governance," "management," "efficiency," "suitability," and "cultural change" are the tenets of economic development for these institutions and the pillars for development in Iraq.[325] In 2004, the World Bank development priorities for Iraq's post-conflict reconstruction was, among other things, "good government."[326] Similarly, UNEP's development plan for Iraq in 2004, 2007 [327] and 2012[328] prioritize "good governance," "sustainability" and the "rule of law" as related to the issue of water. These assertions are reflected in the 2005 to 2007 national development strategy of Iraq: "the first national development strategy produced by a democratically-elected government of Iraq."[329] In its vision, Iraq emphasized "good governance," "eliminating subsidies that discourage farming," and finding innovative methods with the assistance of international donors and partners in "new irrigation methods that strengthen market mechanisms."[330] It further indicated that "inappropriate water management practices" must change and Iraq needs to "desperately change its irrigation schemes," "rehabilitate its land and water resources" and "introduce more salt-tolerant crops from international breeding programs and gene banks."[331] Recent national development plans, especially those addressing post-ISIS reconstruction replicate these perspectives.[332] These

[325] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.
[326] "United Nations/World Bank Joint Iraq Needs Assessment." World Bank. October 2003. Access at < http://siteresources.worldbank.org/IRFFI/Resources/Joint+Needs+Assessment.pdf>
[327] "UNEP in Iraq: Post-conflict Assessment, clean-up and Reconstruction." UNEP. 2007.
[328] "Fresh Water for the Future: A Synopsis of UNEP Activities in Water." UNEP. 2012. Access at < https://wedocs.unep.org/bitstream/handle/20.500.11822/8096/-Fresh%20Water%20for%20the%20future_%20%20A%20synopsis%20of%20UNEP%20activities%20in%20water-20121114.pdf?sequence=3&isAllowed=y>
[329] "National Development Strategy 2005-2007." *Republic of Iraq, Iraqi Strategic Review Board, Ministry of Planning and Development Cooperation,* 2005. Access at < http://siteresources.worldbank.org/IRFFI/Resources/Iraq-NDS-July14-FINALFINAL%5B1%5D.pdf>
[330] *Ibid*.
[331] *Ibid.*
[332] "National Development Plan." Iraq's Ministry of Planning. 2013. Access at < http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/iraq/123.pdf > ; "Iraq's First Conference for the Preparation of the National Development Plan. Minister Al Jumaily: A Major Step Towards the SDGs). UNDP, 2017. Access at < https://reliefweb.int/report/iraq/iraq-s-first-conference-preparation-national-development-plan-minister-al-jumaily-major>

approaches are embraced by local officials in southern Iraq and are used to explain Iraq's ongoing water crisis. While "good governance," "rule of law," and "sustainability" are of course useful in water management, they are bequeathed by international institutions to further a neoliberal agenda of development. According to Chimni, the central motivation for "good governance," and the "rule of law" is "to "create conditions that facilitate the operation of transnational capital."[333] The context in which water scarcity is produced places a heavy weight on local factors such as farming methods and cultural components but obfuscates international, transnational, and national actors' impact on Iraq's water. As a result, the voices of local communities are marginalized, furthering displacement.

Implications of the Difference Between Perceptions and Reality

The international, national and transnational factors that cause population displacement in Iraq as a result of water scarcity are influenced by a complex network of social, economic and political forces. One of the implications of localizing the problems, i.e. irrigation methods, while internationalizing the solutions leads to the addressing of the issue through a narrow and even damaging development model of Iraq that further abstracts water from its social and environmental context in Iraq. By linking water scarcity to notions of "inefficiency" and "primitive culture," Iraq's development model and ways of addressing its environmental issues operates under the assumption that it has to fit "along a linear history where the third world is the primitive past and the western world is the progressive future."[334] Thus, addressing the issue of water scarcity on a national level in Iraq becomes limited to Western concepts of progress. In

[333] Chimni, B.S. "International Institutions Today: An Imperial Global State in the Making." *European Journal of International Law* 15, no. 1 (2004): 1-37.
[334] Natarajan, Usha. "Third World Approaches to International Law (TWAIL) and the environment" in *Research Methods in Environmental Law: A Handbook,* ed. Andreas Philippopoulos-Mihalopoulos (Edward Elgar, Cheltenham and Northampton, 2017), 207.

this manner, Iraq is rendered a "primitive" but "transformable" state with the capacity to transition to a modern first-world-like culture through the intervention of the global North. It is also worth mentioning that such discourses of development ignore the fact that water, as Chapter Two and Three show, was managed more fairly than today in terms of quality and quantity in ancient Mesopotamia and even in pre-2003 Iraq than it is today. However, former methods of managing water are not discussed in current and future water management plans.[335] Officials in southern Iraq, and nationally, cannot conceive of a development plan which addresses water scarcity without following the Western concept of modernization and technological advancement.[336] At a recent conference attended by the MoWR, Government Works and civil society groups to address water scarcity in southern Iraq, the majority of the time and scheduled panels were dedicated to addressing how to make Iraq more technologically advanced to "control water shares," "prevent impingement of governorates and people" and improve the efficiency of dams and dykes to measure precisely the amount of water shares in each governorate.[337] As such, local issues are given to international institutions. With increased engagement of international institutions in addressing water issues in Iraq, the role of transnational actors grows bigger through private investor contracts. As Chapter Three shows, this has been happening since 2003 and is part and parcel of Iraq's current model of development.[338] Iraq is currently studying offers from three foreign companies on a strategic 30-year plan for managing its water resources during this lingering and damaging drought.[339] This reflects notions expressed earlier of the need to

[335] "Interviews with Directors of Directorate," December & January 2017-2018, southern Iraq; see also "National Development Plan." Ministry of Planning. 2013. Access at < http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/iraq/123.pdf >; and "Iraq's First Conference for the Preparation of the National Development Plan. Minister Al Jumaily: A Major Step Towards the SDGs). UNDP, 2017. Access at < https://reliefweb.int/report/iraq/iraq-s-first-conference-preparation-national-development-plan-minister-al-jumaily-major>

[336] "Interviews with officials in southern Iraq." December 1-December 20, 2018, southern Iraq.

[337] "Water Scarcity: Problems and Solutions." Conference in Kerbala, January 6, 2018, southern Iraq.

[338] Refer to Chapter Three

[339] Kami, Aseel, "Iraq seeks 30-year water plan to fight drought," ed. Michael Christie, *Thomas Reuters Foundation News*, September 15, 2009. Access at < https://reliefweb.int/report/iraq/iraq-seeks-30-year-water-plan-fight-drought>

engage international institutions and transnational entities to help Iraq overcome its water crisis and guide it in the path of Western-driven development.

Marginalizing Displaced Population

In addition to narrow perceptions on how to address water scarcity in southern Iraq, the danger of viewing water scarcity as an issue linked to the country's "primitive" and "under-developed" nature oppresses the voices of affected communities while promoting the voice of the global North, particularly corporate actors. As stated above, these vocabularies of development reflect the narrative of international institutions. Conceptions of water scarcity as a matter of "water management," whether internationally, regionally or internally where some operation on water by engineering new supplies or allocating available supplies more efficiently can solve the issue is problematic. Framing the issue as mainly a water management problem dismisses the international and transnational factors that contribute to the crisis. As the Indian socio-environmental activist Sunita Narain asserts, "water is not about water. Water is about building people's institutions and power to take control over decisions." "Taking control over decisions" is relevant to the water crisis in southern Iraq. Discourses on the causes of water scarcity are thus shaped for the purpose of assuming control over decisions on water management and resources.[340] The technologies, as well as the construction, operation, and maintenance of water systems, are increasingly replicating regulatory environments desirable for the profit of transnational corporations; decisions associated with these processes are also largely a matter of remote control from the global North through international and transnational institutions. In that

[340] Linton discusses the issue of water management in indigenous communities in Canada. Many of these issues are relevant in the case of Southern Iraq. See Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.

process, the voices and roles of people in southern Iraq are excluded unless aligned with the dominant knowledge production and project implementation narratives.

The dominance of the North was clear throughout fieldwork in southern Iraq. An illustrative example of this is the four-day Ramsar Talks in Iraq, where government officials, civil society institutions and UN agencies were present, the role of Nature Iraq— the organization that was at the forefront of the marsh restoration—was wholly dismissed during the discussions of the history of the restoration of the Iraqi marshes post-2003.[341] The credit was given to the Ministry of Water Resources, UN Assistant Mission in Iraq (UNAMI) and UNDP; these entities were applauded as key players behind the formulation, financing, and implementation of the marsh restorations. While the UNDP and the MoWR did play a critical role in financing and implementing the restoration projects, the idea of diverting the Euphrates water to the marshes was spearheaded by Jassim Al-Assadi and Azzam Alwash, marsh residents and employees of Nature Iraq.[342]

International, regional, and transnational factors greatly impact the options and decisions that are made about water in the national and local contexts. As a result of top-down knowledge production on water, responses to water crisis function in accordance with programs, plans and technologies that emanate from another place and another entirely different set of hydro-social relations.[343] In the process, displaced communities in southern Iraq become the least likely to have a say in the water system on which their livelihoods depend.[344] The process of top-down

[341] "Ramsar Talks," December 16, 2018, Southern Iraq. The talks were held to initiate a dialogue between Iran and Iraq about the state of the Hewaizah marsh.
[342] "Interview with civil society activist." December 17, 2017. Dhi Qar, Southern Iraq. Information was further verified by individual interviews with community members in the marshes who attested to this statement as well as other Nature Iraq's employees; for full-details read: Erica, Gies. "Restoring Iraq's Garden of Eden." *New York Times*, April 17, 2013. Access at < https://www.nytimes.com/2013/04/18/world/middleeast/restoring-iraqs-garden-of-eden.html>
[343] Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.
[344] See Linton's analysis of the implications of decision-making and knowledge productions on water in Canada's northern reserves. Similar exclusion in decision making is happening there. Linton, Jamie. *What Is Water? The History of a Modern Abstraction*. Vol. 1. Vancouver, Canada: UBC Press, 2010.

policy making isolates communities from their environment and renders peoples' experiences, voices and perceptions trivial. In excluding people from knowledge production about water and its management means further abstracting water from its socio-environmental context. And as Linton argues, abstracting water from its socio-environmental context by only viewing it in a western scientific way allows the state and transnational companies to manipulate water resources, and further displacement.

Conclusion

This Chapter presents data on water scarcity in Iraq and, in light of this data, analyzes the perceptions of affected communities and policy makers, considering the reasons for differences between data and perceptions as well as between different stakeholder perceptions. The Chapter complicates assumptions about primitive culture, progress, and efficiency, and outlines the implications of understanding water in southern Iraq through such discourses. The purpose of this analysis is not to undercut the water governance shortcomings of the Iraqi government on national and sub-national levels. Rather I seek to convey the complex nature and the production of these narratives by adding to local factors the international and transnational factors with a view to enabling more data driven and effective policy-making.

Conclusion

Environmentally-induced displacement is a complex phenomenon. International, national and transnational factors interplay and interact with each other and cannot be analyzed in isolation. One of the drivers of displacement in Iraq has been a result of severe reduction in water levels. This thesis argues that while various factors have always impacted water levels in Iraq, today water is impacted more frequently, unpredictably, and severely than in the past. The issue of water scarcity is due to privatization and commodification of water, climate change, years of wars and destruction, regional development projects, and poor water governance, among other factors; and the biggest impact has been on the most marginalized communities in southern Iraq - the rural communities and the marsh inhabitants.

Policymakers cannot formulate effective policy about water issues and displacement without examining the intersections of the multiple factors that are involved. All the factors, internal, international and transnational, have to be considered in the process of policy making at all levels. Iraqi policymakers, national and international organizations and local communities all focus on different factors when addressing water issues; local communities emphasize international and transnational factors, while policymakers' perception highlights internal and bilateral factors, thus underestimating the importance of other factors and how they impact and interact with each other. Data and evidence shows that water scarcity is likely to increase and contribute to greater numbers of displaced Iraqis. Iraqi policymakers need to formulate policy which acknowledges that, in addition to internal factors, climate change is threatening Iraq in a treacherous way. A global development model that privatizes and commodifies water benefits corporations at the expense of poor Iraqis, in effect accentuating existing inequalities created by

globalization, neoliberalism and capitalism. In addition, Iraq's water crisis must be understood in the context of climate change due to anthropogenic greenhouse gas emissions coming from outside Iraq, particularly from rich countries. Therefore, the range of possible actions that Iraq can take to address its water problems are limited by and connected to environmental policy on an international level. Policymakers need to take into account is how the western model of development treats water as a commodifiable entity separated from its environmental and social context. The problems of water, thus, demands a reconceptualization of economic models that separate natural resources from their environmental and social context. Ultimately, to address water scarcity, all of these factors need to be considered in an interrelated way.

ANNEX

A. Breakdown and Results of Fieldwork Interviews

All fieldwork interviews were conducted from November 28, 2017 to January 6, 2018. Interviews with policymakers and civil society groups took an average of an hour each while interviews with farmers and buffalo herders took an average of 20-25 minutes each. Translation of all interviews and materials in Arabic was undertaken by the author of this thesis. Below is a breakdown of the interviews:

Breakdown of Fieldwork Interviews

Stakeholder Group	**Number and Gender of Interviewees**	
Displaced Populations	**13 (7 M/5 F)** Missan **30 (28 M/3 F)** Dhi Qar **15 (M)** Al Qadyysiah	**20** Farmers **30** buffalo herders **8** farmers and buffalo herders
	Total: 58 (50 M/8 F)	
Local Policymakers	**3 (M)** Directorate of Water Resources in Dhi Qar, Al Qadyysiah and Missan	
	3 (M) Directorate of Agriculture in Dhi Qar, Al Qadyysiah and Missan	
	3 (2 M/1 F) Directorate of Environment Dhi Qar, Al Qadyysiah and Missan	
	1 (M) Deputy Director of the Ministry of Water Resources	
	Total: 10 (8 M, 1 F)	
Civil Society Groups	**3 (M),** 1 in each governorate (Dhi Qarriya, Missan, Al Qadyysiah)	

Total: 71 (62 M/9 F) interviews

Fieldwork Results

Stakeholder Group	**Responses**
58 displaced communities	**Local factors:** - 55 people indicated that impingement is an issue but that climate change and water scarcity is the reason why people impinge on their water shares. - 4 people indicated that impingement is the reason for water scarcity issues without mentioning climate change.

	- 54 perceived issues of patronage networks as another reason for water depletion **International factors:** - 58 indicated that climate change is the main contributing factor to water scarcity **Transnational factors:** - 58 indicated that water has been commodified and that they had to pay for water which made it difficult for them to have drinking water and that
10 local Policymakers	**Local factors:** - 10 indicated that inefficient farming and irrigation practices, and the cultivation of crops such as barley and wheat are contributing to scarcity of water - 5 mentioned that decentralization and miscommunication and mismanagement within governorate offices. **International factors:** - 10 indicated that dam building in neighboring countries is a contributing factor to water scarcity - 2 indicated that climate change is a contributing factor to water scarcity
3 civil society members	**Local factors:** - 3 mentioned the mismanagement of water resources but that it was related to issues of climate change **International factors:** - 3 indicated that climate change is the main contributing factor to water scarcity **Transnational factors:** - 3 spoke about the issues of commodification of water resources but did not mentioned privatization

B. INTERVIEW QUESTIONS

I. RESEARCH QUESTIONS FOR DISPLACED POPULATIONS

1. How big is your family?
2. Who is the head of the households/breadwinner?
3. When did you arrive to this town/village?
4. How long have you been here
5. What is your current source of livelihood?

Migration:

6. Where did you migrate from?
7. What was the source of your livelihood in your native village?
8. Where else have you stayed since you migrated from your native village?
9. Why did you choose to migrate?

Water:

10. What kind of usage was the water for?
11. How have water resources changed in your native village throughout the last decade?
    a. Has this change impacted your decision to move?
    b. How has this change impacted your livelihood? **elaborate on this
    c. Could you do the same work if you would like to in your current location that you did in your villages?
    d. When did water resources start to change/diminish?
    e. How has water scarcity impacted agriculture/herding?

12. What do you think caused the changes in the availability of water?

Implications:

13. How has the move to this new place impacted your livelihood?
14. Were there people who stayed in the village from which you migrated?
    a. Why did they stay?
15. Do you have plans of returning or moving somewhere else?
    a. If not, why?
16. How do you view the link between your movement and water issues that your villages might have had?
17. How should policy makers on a local and international level address issues related to water scarcity?

II. INTERVIEW QUESTIONS FOR CIVIL SOCIETY/ADVOCATES/RESEARCHERS

1. How is the environment relevant to your research/work?
2. What factors have contributed to the water issues Iraq is facing?
   - National
   - International
   - Transnational
3. What do you think about Iraq's policy approach on the environment, especially water management?
4. What is the relationship between movement and water scarcity?
5. What is the role of international actors in addressing water issues in Iraq?
6. How can Iraq's policy approach be improved?
7. How have water issues affected you?

III. INTERVIEW QUESTIONS WITH POLICY MAKERS

Introduction
1. How long have you worked in your current position?
2. What prompted you to get involved in environmental-related policy work?
3. What are some of the overarching environmental issues in Iraq?

Water-related Questions
4. How have the quality and levels of water changed within the last few decades? Or in more recent years?

7. What are the factors that have impacted these water issues?
   - International:
   - Internal:
   - Transnational

On Water and Movement
5. How are these water issues impacting people's livelihoods?
6. How do you understand the link between movement and water scarcity?

Environmental Policies to Water Issues
8. What are you policy approaches to address these issues?
9. In what areas can Iraq's policy approach to water issues be improved?
10. What do you think the role of international actors is?

Environmental law/water management
11. What is the role of the office in implementing environmental law 17 of 1997
12. What factors implicate water resource management between Iraq, Turkey, Iran and Syria?
13. How do you foresee the issue of water sharing with Turkey unfold?

C. CONSENT FORM (English and Arabic)

THE AMERICAN UNIVERSITY IN CAIRO
INSTITUTIONAL REVIEW BOARD

Documentation of Informed Consent for Participation in Research Study

Project Title: *Environmentally-Induced Displacement in Southern Iraq*
Principal Investigator: Tiba Fatli/ tfatli@aucegypt.edu/0101-222-7629

*You are being asked to participate in a research study. The purpose of the research is to investigate the factors of water scarcity in Southern Iraq and its implications on displacement. The findings may be published and/or presented. The expected duration of your participation is half an hour.

The procedures of the research will be as follows: I will ask a question and you can take as much as much as you need to answer it. If the question is irrelevant to you, please feel free to indicate so and we can move on to the next one. If, at any point, you would like to stop for any reason please let me know and we will stop the interview. You do not have to provide any reasoning and are free to withdrawal from the research at any point. Throughout the interview, I will be writing notes, which I will type up in my computer that is protected by a password. The written notes will be destroyed as soon as they are stored in the computer. Once I submit my research to my department where I am studying which is AUC, I will destroy all the records I have on the computer.

*There may be certain risks or discomforts associated with this research, including retaining information and stories of migration. Please, remember that you are free to withdrawal if the questions or the conversation causes any discomfort at any point.

*There will be benefits to you from this research in that it will draw attention to the issue of water scarcity in South Iraq and displacement. I will, to my best ability, incorporate your voices in writing this thesis and presenting it.

*The information you provide for purposes of this research *is confidential*. There will be no name, pictures or recording associated with any of the interviews.

Questions about the research, my rights, or research-related injuries should be directed to Tiba Fatli at +20 0101 222 7629

*Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or the loss of benefits to which you are otherwise entitled.

Signature _____

Printed Name _____

Date _____

D. DATA RECORDED BY THE METEOROLOGY AND SEISMIC MONITORING CENTER, IRAQ'S MINISTRY OF TRANSPORTATION

STATION: DHI QARRIYA ELEMENT: MONTHLY RAINFALL TOTALS (mm)

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
2005	45.2	0.9	33.7	3.9	TR.	0.0	0.0	0.0	0.0	0.0	0.2	21.8
2006	27.5	59.5	6.1	25.2	1.9	0.0	0.0	0.0	0.0	26.9	17.7	81.0
2007	9.2	0.1	75.8	5.5	TR.	0.0	0.0	0.0	0.0	0	TR.	21.9
2008	19.4	10.8	0.4	1.4	0.2	0.2	TR.	0.0	0.2	32.2	0.7	0.0
2009	0.3	7.1	18.6	4.6	1.5	0.6	0.0	0.0	0.0	0.2	1.7	22.3
2010	2.6	2.7	0.5	29.2	14.8	0.0	0.0	0.0	0.0	0.1	0.4	7.3
2011	7.5	19.9	13.8	21.2	9.7	0.0	0.0	0.0	0.0	TR.	13.0	0.0
2012	6.2	21.6	1.3	6.7	TR.	0.0	TR.	0.0	0.0	2.6	58.5	19.3

2013	8.8	0.2	0.3	TR.	36.0	0.0	0.0	0.0	0.0	1.8	126.4	1.7
2014	78.3	0.5	83.0	16.1	TR.	0.0	0.0	0.0	0.0	24.6	13.3	3.9
2015	0.9	14.4	7.2	1.0	0.9	0.0	0.0	0.0	0.0	24.4	8.3	36.1
2016	0.4	12.9	10.0	7.6	0.1	0.0	0.0	0.0	0.0	0.0	24.5	2.8

STATION:KUT **ELEMENT: MONTHLY RAINFALL TOTALS (mm)**

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
2005	M	M	M	M	M	M	M	M	M	M	M	M
2006	M	M	M	M	M	M	M	M	M	M	M	M
2007	M	M	M	M	M	M	M	M	M	M	M	M
2008	M	M	M	M	M	M	M	M	M	M	M	M
2009	M	M	M	M	M	M	M	M	M	M	M	M
2010	M	M	M	M	M	M	M	M	M	M	M	M
2011	51.3	18.5	2.1	30.6	2.1	0.0	0.0	0.0	0.0	3.1	0.3	1.3
2012	1.1	4.7	5.1	1.0	0.9	0.0	0.0	0.0	0.0	5.4	48.9	50.3
2013	28.3	7.3	TR.	TR.	87.5	0.0	0.0	0.0	0.0	0.5	53.8	7.1
2014	54.2	30.7	38.0	16.9	1.0	0.0	0.0	0.0	0.0	12.6	35.9	TR.
2015	8.9	5.2	28.2	6.0	6.5	0.0	0.0	0.0	0.0	6.4	61.0	44.3
2016	21.3	7.2	34.1	38.3	0.1	0.0	0.0	0.0	0.0	0.0	TR.	20.7

STATION:AL QADYYSIAH **ELEMENT: MONTHLY RAINFALL TOTALS (mm)**

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
2005	37.9	11.2	12.1	6.6	TR.	0.0	0.0	0.0	0.0	0.0	32.8	TR.
2006	29.9	27.4	8.1	8.9	4.9	0.0	0.0	0.0	0.0	2.3	17.0	8.4
2007	12.4	9.2	0.6	4.5	1.9	0.0	0.0	0.0	0.0	TR.	TR.	15.0
2008	22.9	0.9	0.3	3.1	TR.	TR.	0.0	0.0	0.0	7.8	8.5	0.7
2009	TR.	2.7	7.8	9.9	TR.	TR.	0.0	0.0	0.0	5.5	2.8	17.5
2010	3.3	4.8	5.1	18.4	8.2	0.0	0.0	0.0	0.0	TR.	TR.	9.3
2011	27.1	17.6	1.8	26.0	2.0	0.4	0.0	0.0	0.0	1.4	TR.	5.1
2012	4.8	5.6	0.6	TR.	0.8	0.0	0.0	0.0	0.0	4.0	57.0	26.0
2013	25.6	4.3	TR.	0.1	31.6	0.0	0.0	0.0	0.0	TR.	61.1	1.3
2014	46.1	1.5	19.3	12.6	1.5	0.0	0.0	0.0	0.0	2.2	20.7	1.5
2015	2.2	8.5	10.8	5.5	1.5	0.0	0.0	0.0	0.0	3.4	69.5	38.3
2016	11.6	16.4	23.7	6.8	TR.	0.0	0.0	0.0	0.0	0.0	TR.	9.8

STATION:MISSAN **ELEMENT: MONTHLY RAINFALL TOTALS (mm)**

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
2005	79.3	1.8	37.9	6.7	0.4	0.0	0.0	0.0	0.0	0.0	3.1	29.0
2006	37.1	71.9	6.3	11.8	0.5	0.0	0.0	0.0	0.0	25.6	33.0	65.2
2007	14.2	1.2	64.2	9.1	1.7	0.0	0.0	0.0	0.0	0.0	1.5	33.2
2008	34.9	3.6	0.3	2.4	TR.	0.0	0.0	0.0	0.4	25.4	23.6	TR.
2009	TR.	4.0	7.4	10.5	8.7	0.0	0.0	TR.	0.4	45.8	4.4	94.7
2010	6.6	17.6	0.1	69.9	25.9	0.1	0.3	0.1	0.0	0.0	TR.	7.7
2011	55.4	15.0	11.2	17.4	2.6	0.0	0.0	0.0	0.0	TR.	9.1	TR.
2012	5.6	18.8	0.3	3.0	0.1	0.0	0.0	0.0	0.0	3.2	131.1	50.0
2013	26.0	4.3	0.2	TR.	138.4	0.0	0.0	0.0	0.0	0.9	147.0	7.8
2014	66.7	2.6	63.5	26.5	2.7	0.0	0.0	0.0	0.0	20.0	12.5	12.5
2015	8.1	20.5	9.5	3.8	2.6	0.0	0.0	0.0	0.0	29.5	19.5	35.0
2016	1.6	24.6	18.0	10.7	7.2	0.0	0.0	0.0	0.0	0.0	6.2	13.3

STATION: DHIQARRIYA	ELEMMENT: MEAN MAX. TEMP.(C°)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
2005	18.0	19.9	26.3	33.9	39.8	43.7	46.6	46.0	42.0	36.2	24.9	22.7
2006	18.2	20.4	28.0	33.6	40.1	46.0	45.3	48.3	42.4	36.8	24.1	15.0
2007	15.7	21.8	25.7	31.6	41.1	44.4	45.7	46.2	43.2	38.0	27.9	19.5
2008	14.2	20.7	31.2	36.0	40.0	43.8	46.5	47.1	43.1	34.9	25.3	20.2
2009	18.2	23.0	26.9	31.5	40.0	43.2	44.7	45.9	41.4	36.9	25.9	21.9
2010	22.4	24.1	30.9	34.5	40.3	45.9	47.2	48.8	44.7	38.9	29.2	23.3
2011	22.3	21.2	26.6	32.5	40.2	45.8	47.3	48.7	44.6	38.6	28.8	21.0
2012	18.4	20.1	25.1	31.4	40.1	44.7	47	.46.3	42.7.	36.7	26.1	21.1
2013	18.7	23.7	29.1	33.6	36.5	42.8	45.6	45.5	42.2	33.8	24.3	17.9
2014	16.8	20.8	26.9	33.6	39.9	43.8	45.6	46.6	42.7	34.4	25.1	22.2
2015	20.1	22.4	27.5	33.4	41.7	44.5	47.3	47.9	44.3	37.5	25.9	18.3
2016	18.7	23.6	27.8	34.7	40.2	45.0	47.3	48.6	42.7	37.6	26.6	18.7